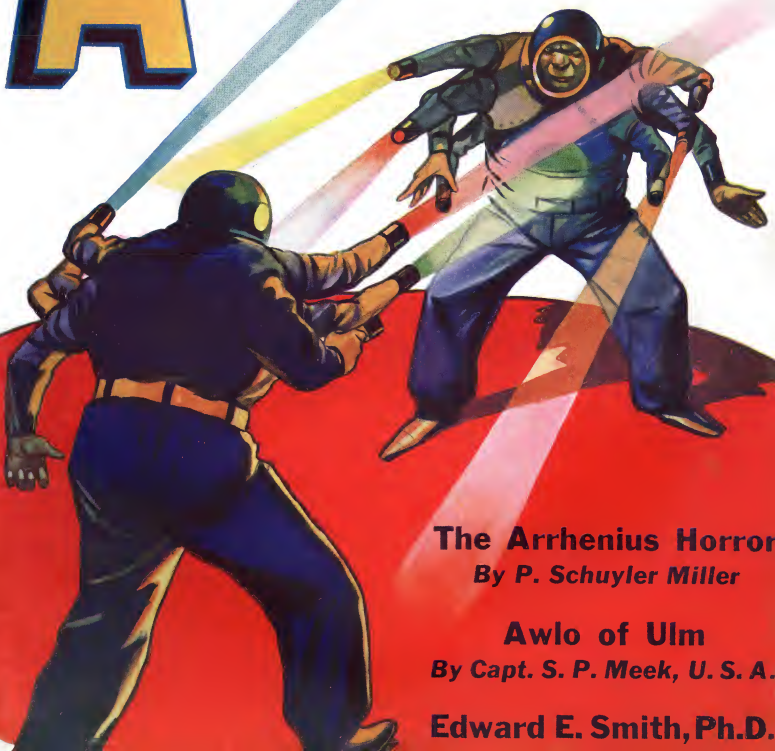


# ★ AMAZING STORIES

**September  
25 Cents**

IN CANADA 30 CENTS



**The Arrhenius Horror**  
*By P. Schuyler Miller*

**Awlo of Ulm**  
*By Capt. S. P. Meek, U. S. A.*

**Edward E. Smith, Ph.D.**

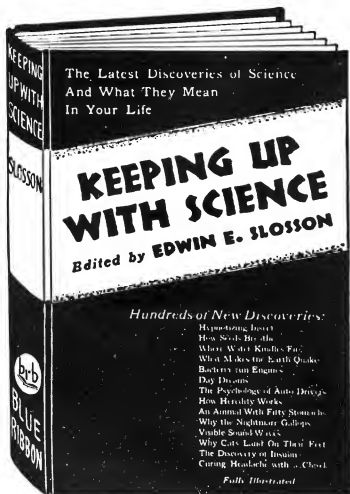
# This Big Phenomenal Book

Edited by Edwin E. Slosson

# FREE

for a limited time  
only

With a Special  
New Offer from  
**AMAZING STORIES**



**H**ERE is a scientific book that you can apply in a thousand ways to your own life! Over 300 pages, containing many illustrations, bound in blue cloth.

All the latest discoveries that mean something to you—all the things of new and breathless interest about which you want to know the important facts. Best of all, this is a book you can pick up and put down, a book to which you can refer time after time, and which will be as valuable to you years from today as it is at the present moment.

It is written in "topic" form, not one of which will take you more than ten minutes to read, and as diversified as "The Stuff Stars Are Made Of," and—"Lunch Baskets for Baby Plants!"

People all over the country have paid a substantial sum for this book, but **AMAZING STORIES** magazine is offering it to you **FREE!**—with a 15 months' subscription. A \$4.75 value for only \$3. Simply enclose this amount and send it with the coupon below. We prepay the postage. But don't delay—our stock of these books is limited, and to take advantage of this offer you will want to sign the coupon immediately!

AMAZING STORIES, Dept. 2109-A  
381 Fourth Ave., New York, N. Y.

Please send me immediately **KEEPING UP WITH SCIENCE**, and enter my subscription for 15 months of **AMAZING STORIES** for \$3.00 which I am enclosing herewith. You pay all postage.

Name.....

Address.....

City..... State.....



**MAIL  
COUPON  
TODAY!**

Here Are Just a  
Few Chapter Heads  
from  
**KEEPING UP  
WITH SCIENCE**

Science and Pseudo-Science  
Man Sees 6,000,000,000,000,000,000 Miles  
Making the Camera See Farther  
The Unconscious  
The Discovery of Insulin  
The Heavens 25,000 Years Hence  
Educating the Amoeba  
How Auto Tires Wear Out  
A Four-footed Bird  
The Marvelous Migrations of the Eel  
The Mechanism of Heredity  
A Living Stone Drill  
Chopping Off the Head Changes the Sex  
Curing Headache with a Chisel  
The Heat of a Star  
Taking the Earth's Temperature  
Six Sarts of Smells  
Were the Cave Man's Eyes Better than Ours?  
Health and Financial Panics  
The Most Efficient Incandescent Light  
The Smallest Thing in the World  
Who Killed the Dinosaurs?  
Visible Sound Waves  
An Animal with Fifty Stomachs  
A New Kind of Compass

**AND 114 MORE!**



J. E. Smith, President, National Radio Institute, the man who has directed the Home-Study training of more men for the Radio Industry than any other man in America.

# YOU'RE WANTED for a Big Pay Radio Job

*I'll Train You at Home in Your Spare Time  
for RADIO · TELEVISION · TALKING MOVIES*



## Set Servicing

Spare-time set servicing is paying N. R. I. men \$200 to \$1,000 a year. Full-time men are making as much as \$65, \$75 and \$100 a week.



## Broadcasting Stations

Need trained men continually for jobs paying \$1,200 to \$5,000 a year.



## Ship Operating

Radio operators on ships see the world, free and get good pay plus expenses.

## Aircraft Radio

Aviation is needing more and more trained radio men. Operators employed through Civil Service Commission earn \$1,620 to \$2,800 a year.

**IF YOU** are earning a penny less than \$50 a week, send for my book of information on the opportunities in Radio. It is free. Clip the coupon NOW. Why be satisfied with \$25, \$30 or \$40 a week for longer than the short time it takes to get ready for Radio?

## Radio's Growth Opening Hundreds of \$50, \$75, \$100 a Week Jobs Every Year

In about ten years Radio has grown from a \$2,000,000 to a \$1,000,000,000 industry. Over 800,000 jobs have been created. Hundreds more are being opened every year by its continued growth. Men and young men with the right training—the kind of training I give you—are stepping into Radio at two and three times their former salaries. J. A. Vaughn, 4075 S. Grand Boulevard, St. Louis, Mo., writes: "Before I entered Radio I was making \$35 a week. Last week I earned \$110 selling and servicing sets. I owe my success to N. R. I."

## You Have Many Jobs To Choose From

Broadcasting stations use engineers, operators, station managers and pay \$1,200 to \$5,000 a year. Manufacturers continually need testers, inspectors, foremen, engineers, service men, buyers, for jobs paying up to \$7,500 a year. Shipping companies use hundreds of Radio operators, give them world-wide travel with board and lodging free and a salary of \$80 to \$150 a month. Dealers and jobbers employ service men, salesmen, buyers, managers, and pay \$30 to \$100 a week. There are many other opportunities too.

## So Many Opportunities Many N. R. I. Men Make \$200 to \$1000 While Learning

The day you enroll with me I'll show you how to do 28 jobs, common in most every neighborhood, for spare-time money. Throughout your course I send you infor-

mation on servicing popular makes of sets; I give you the plans and ideas that are making \$200 to \$1,000 for hundreds of N. R. I. students in their spare time while studying. My course is famous as the one that pays for itself. G. W. Page, 2210 Eighth Ave., S., Nashville, Tenn., writes: "I picked up \$635 in my spare time while taking your course."

## Talking Movies, Television and Aircraft Radio are Also Included

Special training in Talking Movies, Television and home Television experiments, Radio's use in Aviation, Servicing and Merchandising Sets, Broadcasting, Commercial and Ship Operating are included. I am so sure that I can train you satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lessons and Instruction Service upon completing.

## 64-page Book of Information Free

Get your copy today. It tells you where Radio's good jobs are, what they pay, tells you about my course, what others who have taken it are doing and making. Find out what Radio offers you, without the slightest obligation. ACT NOW!

J. E. SMITH, President  
National Radio Institute  
Dept. IJS  
Washington, D. C.



**THIS COUPON IS GOOD for  
One FREE COPY OF MY BOOK**

*mail it  
now*

J. E. SMITH, President  
National Radio Institute, Dept. IJS  
Washington, D. C.

Dear Mr. Smith: Send me your free 64-page book, "Rich Rewards in Radio." I understand this does not obligate me and that no salesman will call.

Name.....

Address.....

City.....State.....

## Talking Movies

An invention made possible by Radio. Offers many fine jobs to well-trained Radio men, paying \$75 to \$200 a week.



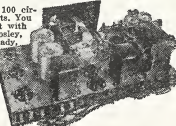
## Television

The coming field of many great opportunities is covered by my course.



## I give you 8 Outfits of Radio Parts for Practical Home Experiments

You can build over 100 circuits with these outfits. You build and experiment with the circuits used in Croley, Atwater Kent, Eveready, Majestic, Zenith, and other popular sets. You learn how these sets work, how they work, how to make them work. This makes learning at home easy, fascinating, practical.





JULES VERNE'S TOMBSTONE AT AMIENS  
PORTRAYING HIS IMMORTALITY

# AMAZING STORIES

## Scientific Fiction

Vol. 6

September, 1931

No. 6

### In Our Next Issue

**THE STONE FROM THE GREEN STAR**, by Jack Williamson. (A Serial in 2 parts.) Part I, a story by this author hardly requires any comment. His ability as a science fiction writer, seems by their unanimous agreement, to fit in with the requirements of the most critical fans of **AMAZING STORIES**. What adventures men of science will go through and the dangers they will risk, to obtain that which they believe will aid mankind, is strikingly brought out in this excellent serial.

**THE SPHERE OF DEATH**, by J. W. Groves. It is not pleasant to contemplate what the next war will probably be like, now that chemists are on the job. Perhaps for that reason some inventions that are bound to come in the future have not yet been thought of, for humanity is not ready to use marvelous inventions purely as a gift to mankind. It makes one uneasy to think of what might happen if, by a strange accident, some such thing as this author describes, should be invented. But this story holds the reader's interest and is provocative of thought. (Crowded out of the September issue.)

**PRIMA DONNA**, 1980, by Bernard Brown. From the country of H. G. Wells, comes a story of the future in the cultural field. It is a unique story, cleverly told and very interesting in its depiction of the possibilities of future entertainment. (Crowded out of the September issue.)

**A MATTER OF ETHICS**, by Harl Vincent. Post-operative attention is every bit as important as the operation itself. Many very serious complications—even death—have resulted from a surgeon's negligence. Is it inconceivable, therefore, that a master surgeon, with an unusual knowledge of electricity, might, with careful premeditation, cause extraordinary results? According to our well-known author—it is highly probable. This tale is certainly plausible.

And other unusual fiction.

### In Our September Issue

**Awlo of Ulm**  
By Capt. S. P. Meek, U. S. A. .... 486  
Illustrated by Morey

**The Arrhenius Horror**  
By P. Schuyler Miller ..... 514  
Illustrated by Morey

**What Do You Know?**  
(Science Questionnaire) ..... 527

**The Lunar Chrysalis**  
By Raymond Gallun ..... 528  
Illustrated by Morey

**Spacehounds of IPC**  
(A Serial in three parts.) Part III  
By Edward E. Smith, Ph.D. .... 542  
Illustrated by Wesso

**Discussions** ..... 571

### The Cover

This issue depicts a scene from the story entitled, "Awlo of Ulm," by Capt. S. P. Meek, in which Courtney of Ulm and Kapioma, Sihama of the Kauans are engaged in mortal combat with specially outfitted suits, plentifully equipped with varied rays, one more destructive than the rest. This is the final battle between the two men to settle the dispute in regard to Awlo, Courtney's Sihama.

Cover illustration by Morey

Published Monthly by Teck Publishing Corporation, Jamaica, N. Y.

#### OFFICERS

Leo Ellmaker, President  
Warren P. Jeffery, Vice President  
William Thompson, Treasurer  
Wesley F. Page, Secretary

#### EDITORIAL AND EXECUTIVE OFFICES

350 HUDSON STREET, NEW YORK CITY, N. Y.  
Entered as second class matter at the Post Office at Jamaica, N. Y., under the act of March 3, 1879. Copyright, 1931, by Teck Publishing Corporation. All rights reserved. Title Registered at the U. S. Patent Office. Printed in the United States of America. The contents of this magazine must not be reproduced without permission. We cannot be responsible for lost manuscripts, although every care is taken for their safety.

25c a Copy, \$2.50 a year,  
\$3.00 in Canada, \$3.50 in  
Foreign Countries. Sub-  
scribers are notified that  
change of address must reach  
us five weeks in advance of  
the next date of issue.



# BIG PAY JOBS

*open*

## for the Radio Trained Man

Scores of jobs are open to the Trained Man—jobs as Designer, Inspector and Tester—as Radio Salesman and in Service and Installation work—as Operator, Mechanic or Manager of a Broadcasting station—as Wireless Operator on a Ship or Airplane—jobs with Talking Picture Theatres and Manufacturers of Sound Equipment—with Television Laboratories and Studios—fascinating jobs, offering unlimited opportunities to the Trained Man.

## Ten Weeks of Shop Training

Come to Coyne in Chicago and prepare for these jobs the QUICK and PRACTICAL way—BY ACTUAL SHOP WORK ON ACTUAL RADIO EQUIPMENT. Some students finish the entire course in 8 weeks. The average time is only 10 weeks. But you can stay as long as you please, at no extra cost to you. No previous experience necessary.

## TELEVISION *and* TALKING PICTURES

In addition to the most modern Radio equipment, we have installed in our shops a complete model Broadcasting Station, with sound-proof Studio and modern Transmitter with 1,000 watt tubes—the Jenkins Television Transmitter with dozens of home-type Tele-

vision receiving sets—and a complete Talking Picture installation for both “sound on film” and “sound on disk.” We have spared no expense in our effort to make your training as COMPLETE and PRACTICAL as possible.

## FREE Employment Service to Students

After you have finished the course, we will do all we can to help you find the job you want. We employ three men on a full time basis whose sole job is to help our students in finding positions. And should you be a little short of funds, we'll gladly help you in finding part-time work while at school. Some of our students pay a large part of their living expenses in this way. Mail the coupon below!



## COYNE IS 32 YEARS OLD

Coyne has been located right here in Chicago since 1899. Coyne Training is tested—proven by hundreds of successful graduates. You can get all the facts—FREE. JUST MAIL THE COUPON FOR A FREE COPY OF OUR BIG RADIO AND TELEVISION BOOK, telling all about jobs... salaries... opportunities. This does not obligate you. JUST MAIL THE COUPON!

**RADIO DIVISION COYNE ELECTRICAL SCHOOL**  
H. C. LEWIS, President Founded 1899

500 S. Paulina St., Dept. 61-8C Chicago, Ill.

H. C. LEWIS, President

Radio Division, Coyne Electrical School  
500 S. Paulina St., Dept. 61-8C, Chicago, Ill.

Send me your Big Free Radio and Television Book. This does not obligate me in any way.

Name .....

Address .....

City..... State.....



WILBUR C.  
WHITEHEAD

IT is with deep regret that we have to chronicle the death of Mr. Whitehead. For a number of years he has figured as one of the literary editors of *AMAZING STORIES*. In the early days he influenced the conduct of the magazine by his advice. He had an extensive knowledge of scientific fiction, which was his hobby. He was a most interesting personality and the writer has in his memory a number of interesting visits and talks. One of the world's leading expositors of bridge, in its modern developments of contract bridge and auction bridge, he was also a great admirer of the old original game of classic whist, which is still played by many groups of players. He died on the French steamer *Ile de France*. He was the founder of a club devoted to the game—the Cavendish Club of this city. It is interesting to note that the name of this club was taken from the *nom de plume* of one of the authorities of the last century on games of cards, Dr. Henry Jones. Mr. Whitehead was emphatically a student and a reader. We will miss him.

# AMAZING STORIES

## THE MAGAZINE OF SCIENTIFICTION

T. O'CONOR SLOANE, Ph.D., *Editor*MIRIAM BOURNE, *Managing Editor*C. A. BRANDT, *Literary Editor*


---

*Extravagant Fiction Today . . . . . Cold Fact Tomorrow*


---

# Inconsistencies and Contradictions

By T. O'Connor Sloane, Ph.D.

**T**HERE are two attributes of the cosmic system of which the earth forms a part. They are so impressive on account of what may be termed their relative proportions that they cannot but astonish one who realizes them. One of these things, which has been spoken of in other editorials, is the incredible waste of the universe. If the distance of the planet Pluto from the sun be taken as the radius of a sphere, the area of the surface of that sphere, which will be about four times the area of Pluto's orbit, will give us the space over which the sun's radiations are distributed within that distance. All of these radiations, as far as we know, except the relatively trivial amounts intercepted by the planets of the solar system, go completely to waste. The amount of the sun's heat caught by the planets and asteroids will be found to be a minute fraction, what we may term a differential, of the total radiation of the sun.

Generations of engineers have been improving engines and other sources of power production and of power distribution with the 100% of efficiency before them as a tantalizing example of what the perfect heat engine, whose operations would have to start at the absolute zero, would produce, if there were no such things as friction and heat losses. But the engineer who did no better than the sun in the utilization of energy would be an absurdity in the engineering world. The solar system is the great waster of heat energy, as far as we know it; it is an example of a reckless squandering of energy and, metaphorically speaking, of dreadfully bad efficiency.

We now may look into the subject of matter, and this brings us up again to a curious condition of things. Matter, in the ordinary acceptance of the word, is of great scarcity in the universe. If we take the solar sphere, or better, spheroid, with Pluto's distance from the sun as its radius, calculate its volume and compare it with the volume of the sun and the planets combined, this combined volume will be an astonishingly small fraction of Pluto's sphere, as we may term it. The distribution of stars in the universe has been compared to a few particles of dust in a great metropolitan railroad station.

Life on the earth depends on organic matter, and living beings, plant or animal, are made up of organic substances. In a general way the animal world may be said to burn them up, to maintain oxidation of organic matter, and to evolve the products of combustion into the atmosphere, while the vegetable world to a great extent does the reverse, undoing the change in the atmosphere brought about by the respiration of animal life, and reducing the carbon dioxide expired by animals.

The vegetation, which is essential for the support of animal life, depends upon a few inches of soil for its growth. This layer may be taken as from one hundred millionth to one fifty millionth of the earth's diameter. Yet it is calculated that an

area of this trivial layer, equal to the size of the state of Texas, would support the population of the United States.

There is a strong probability that the earth consists of a metallic core, principally of iron, with a very thin crust covering it, and the products of this crust, along with the oxygen of the air, are all that we have to keep us alive, while plant life utilizes the carbon dioxide of the atmosphere. And here we are up against the subject of scarcity again. The food required by humanity is so astonishingly scarce, that it never and over again there have been eras of starvation on account of this scarcity.

We have not the least evidence that there is any life on the other planets and stars. The canals of Mars have fallen into disrepute, and are seldom appealed to as evidence of life on that chilly planet. As far as we know, life is a pre-eminent scarcity in the universe. There seem to be an almost infinity of uninhabited spheres in it.

And now we come to man, the "Wondrous Creature" as Pope calls him in his "Essay on Man." After our generalizations of the scarcity of things and the inefficiency, in a mechanical sense, of the universe, we may consider the human being. Our conclusions about the universe experience a great upsetting when we try to apply them here. The intellect of man is the great, amazing and efficient phenomenon of the universe. What it has done is beyond all astonishment. If a star many light-years distant from us is moving directly towards us, or directly away from us, we can determine the direction of its motion and the speed of its progress. We can produce films and striations so fine that they show prismatic colors. This brings us almost into the world of molecules. Going back to the great stellar world, we determine the specific gravity and weight of the celestial bodies, and coming back to the other extreme, the molecules, we calculate their size and weight and find how they too, while they make up matter, are spaced relatively far apart. We even go down below the molecule and study the electrons which build up the atom, and go among the stars and study the cosmic rays.

Philosophers tell us that will, memory and understanding are a sort of summary of the attributes of the human mind. Animals possess these quantities of a very low degree—man in a very high degree. We hear of men who know forty languages. Some can add great rows of figures correctly without thinking and without knowing how they do it. Then came the invention, as it may be called, of the calculus, Morse's famous telegraph message might be paraphrased to read "What hath man wrought."

The features of the universe of which we have spoken are so perplexing, leading us up, for it is not down, to this strange little microcosm, as man has been termed, that we may almost say that we live in a universe of inconsistencies and contradictions. Study leads us into perplexities and puzzles.

# Awlo of Ulm

*FOR those who haven't read "Submicroscopic," in the August AMAZING STORIES, we give the following résumé: Courtney Edwards, a Hawaiian-born world-war flyer, turned to scientific research as a hobby after being demobilized. He developed an "electronic vibration adjuster," by means of which he was able to alter the period of movement of the electrons in the atom and thus increase or decrease his size at will. He reduced himself to submicroscopic proportions and found in a hidden Nevada valley an entire inhabited world of infinitesimal dimensions. By virtue of his marriage to Awlo, daughter of Kalu, Sibama of Ulm, he became crown prince of the tiny kingdom. After several years of happiness with Awlo, the capital city of Ulm was besieged by the Mena, a barbarous race of black cannibals. Courtney conceived the idea of defeating the Mena by the use of modern high-powered rifles which were unknown in Ulm. Accompanied by Awlo and by Lamu, Prince of Ame, the second city of Ulm, he returned to normal size to procure them. Lamu, who was a rejected suitor of Awlo's, learned to operate the adjuster. He kidnapped Awlo and fled with her in Courtney's machine. Courtney hastily assembled materials and built another adjuster, which he loaded with rifles and ammunition and made ready to depart to the rescue of his princess and to the relief of beleaguered Ulm.*

Illustrated by MOREY

**W**HEN I allowed my manuscript, "Submicroscopic," to be published, I had no intention of telling to the world the balance of my adventures. Frankly, I did not expect to be believed. The events of which I told were so fantastic, so contrary to the ordinary experiences and preconceived notions of men of this plane of existence, that I expected the story to be passed off as an idle tale, told only to amuse. The editor of *AMAZING STORIES* was kind enough to forward to me a number of comments received. When I read them over I found, to my astonishment, that there were a small number of discerning thinkers who realized that my story was one of actual facts. Most of them expressed regret that the end of the story was, so they thought, a sealed book to them. It is to this select group, who I feel are my friends, that this story is addressed. The interest they have shown in my welfare and in that of my beloved princess is so heart-felt that I feel that I can do no less than publish for their benefit the extraordinary events which followed that seemingly endless night in my hidden Nevada

valley before I started in pursuit of Awlo and her abductor.

Impatiently I watched the sun rise over the Tim-pahutes. The sunrise is a little later in Ulm than in this plane because of the height of the mountain (grains of sand!) which surround the empire. I judged it best to wait for broad daylight before I plunged into what might easily be the unknown. I had set my electronic vibration adjuster as nearly as possible over the spot where Lamu and my princess had disappeared but I know that a distance which could not be detected under the microscope in this plane might be miles in Ulm and I had little hope of landing in the beleaguered city.

At last I felt that the time had come. I entered my newly completed adjuster, closed the switch and was on my way. Rapidly the scenery grew to Brobdingnagian proportions and then disappeared as it grew too large for my eyes to see or my mind to comprehend. I watched the indicator dial as the needle crept toward infinity. Presently its motion ceased and the high whine of my generators became audible. The note ran down the scale of audibility and subsided into silence. I looked

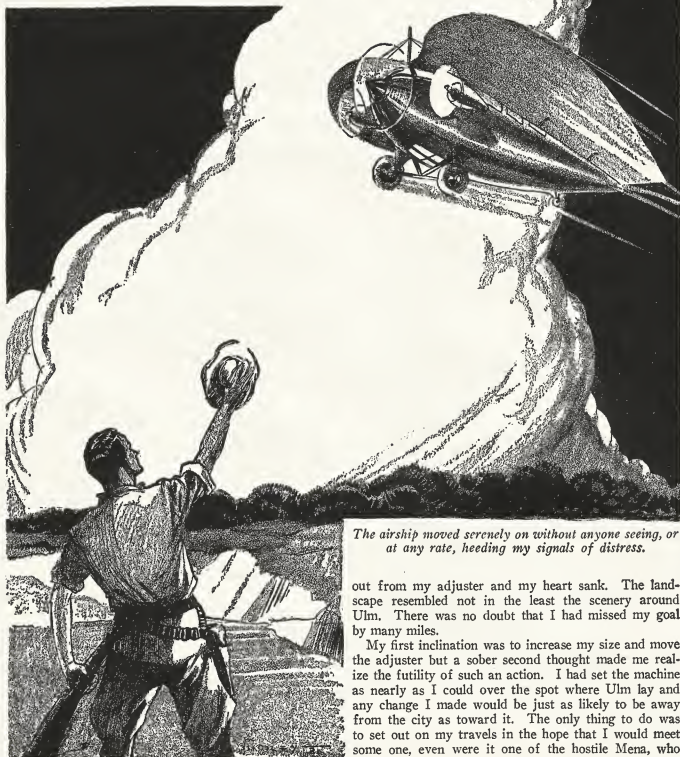


# *A Sequel to "Submicroscopic"*

By

CAPT. S. P. MEEK, U. S. A.

Author of "The Drums of Tapajos,"  
"The Last War," etc.



*The airship moved serenely on without anyone seeing, or at any rate, heeding my signals of distress.*

out from my adjuster and my heart sank. The landscape resembled not in the least the scenery around Ulm. There was no doubt that I had missed my goal by many miles.

My first inclination was to increase my size and move the adjuster but a sober second thought made me realize the futility of such an action. I had set the machine as nearly as I could over the spot where Ulm lay and any change I made would be just as likely to be away from the city as toward it. The only thing to do was to set out on my travels in the hope that I would meet some one, even were it one of the hostile Mena, who

could give me some idea of the direction in which to travel. I slung a couple of extra bandoliers of ammunition over my shoulders, picked up my rifle and stepped out of the adjuster. A second thought made me pause. I retraced my steps and opened an arm locker. From it I took two small-caliber .32, automatic pistols, which I placed in shoulder holsters under my shirt. The little guns held six rounds each and while they were small, they carried hollow point bullets which would have a deadly effect at short range. With my armament thus reinforced, I was ready to start my travels.

The country in which I found myself was wild beyond description. In place of the dense semi-tropical vegetation which I had been accustomed to associate with my submicroscopic empire, there was nothing but rock, bare rugged rock. Huge masses of stone, hundreds and even thousands of feet high, lay piled one on another as though a race of giants had tossed them about in sport, recking little of where they fell. There was none of the solidity and symmetry which marks the mountains of the larger plane. Many of the stones seemed to be precariously balanced and even where they were wedged together, the effect was one of insecurity. I shuddered and caught myself afraid to stir lest even my tiny weight would start one of the masses of rock into motion and engulf me and all my possessions in cataclysmic ruin. I walked in a gingerly fashion over to one of the unstable appearing masses of rock and rested my hand against it. It was solid to the touch and I pressed, gently at first, and then with all my strength, trying in vain to budge the mass which must have weighed thousands of tons, if my own negligible weight be taken as being its normal one hundred and eighty pounds. Satisfied that it was beyond my strength to move it, I felt safer, and began to consider in which direction I should start my travels.

I racked my brain for a clue. Somewhere in memory's vaults there was an elusive something that this jumbled phantasmagoria of rock reminded me of. Suddenly I remembered it.

In the days when I had been hailed as the Crown Prince of Ulm, the husband of its ruler's only child, I had been much interested in the ancient legends which told the history of the empire. Ulm had no written language and no records to which I could refer other than the traditions and legends which had been handed down from father to son. These legends were preserved in metrical form. The learning and reciting of them on occasion was the principal duty of the class of persons known as *tamaaini*\*, generally elderly men who were not of the noble class, but who, because of their profession, had an *entrée* to the court and many of the privileges of nobility. Some of them had marvelous memories and could repeat without faltering thousands after thousands of lines of the old legends. It was from them that I learned that the Mena had originally come down from the north through the barren passes in the mighty mountains which border Ulm on all sides. I had never been able to gather much information as to the derivation of the people of Ulm themselves. It seemed that so far as the *tamaaini* knew, they had always lived in their present location. There were, however, here and there in the legends dim and little understood references to other places and it was one of these passages that I strove desperately to recall. Suddenly, like a flash, the long forgotten tale came to my mind.

It told of the flight of the natural son of a ruler of Ulm who had tried to wrest the throne from his legitimate half-brother, after his father's death, and it described his own defeat and death. The victor pursued him with a handful of guards and caught him in a place where "giants played as children, tossing mountains hand to hand." There they encountered a race of *kahumas* or wizards who flew through the air like birds and who shot fire from their many hands. They could "kill from afar with fire" and they allowed no one who entered their land to return. Evidently, at least one of the party returned to Ulm with the record of the attempted usurper's death, which the legend goes on to detail at great length. The passage had always interested me, for it seemed to hint at a higher civilization than was possessed by the brave and chivalrous warriors of Ulm.

I LOOKED about me and I did not blame the fancy of the ancient bard who had laid the condition of the landscape to the gambols of giants or to the evil machinations of wizards. Certainly his description was an apt one. The forbidden land lay, according to the legend, "toward the setting sun." If the tale were true and if I were looking on the scene of that ancient tragedy, Ulm should lie to the east and not more than a few days' journey away. It was a pretty slender clue but it was the only one I had. Without it I had no idea of which direction to take, so I decided to trust to the accuracy and authenticity of a legend of unknown antiquity and make my way eastward.

My first step was to fix the landscape in my mind and to take bearings with my marching compass on the most prominent points of the scenery. If I found my way back to Ulm my entire labor and travail would be lost unless I were able to return to the adjuster and its precious load of weapons. Three huge peaks dominated the scene to the north and they stood so that the farther one lay exactly in the middle of the interval between the two nearer ones. The bearing of the farther peak was a quarter point west of magnetic north. Exactly south east was another peak with a peculiar cleft near its summit. A short study enabled me to fix the location of the adjuster so firmly in my mind that I was certain that I could find the place again. With a final look around, I shouldered my rifle, set my face to the east and set out.

Despite the ruggedness of the country I was able, by the aid of my marching compass, to keep going in the general direction of east pretty well although I had to make several lengthy detours around masses of rock. For several hours I pushed on and found the country gradually getting a little less rugged. There were no signs of animal life but once in a while I came across a tuft of vegetation resembling the bunch grass so common in some parts of the west.

As the sun got higher it grew intolerably hot and I began to regret that I had loaded myself so heavily with food and especially ammunition and had brought only two quarts of water. It was too late to retrace my steps, so I husbanded my water as carefully as possible and kept going. Before noon the heat got so bad that I began to look for a place where I could find a little shelter.

Ahead of me I spied what looked like a cave in the rock and I pressed forward to investigate it. It was not a true cave but it was a fair imitation of one made by two huge masses of rock leaning against one another.

\*Compare the Hawaiian word, "*kamaaini*," an old inhabitant.

I had no idea how far into the rock the cavity extended but it was cool in the shade and I discarded my pack with a sigh of relief. I also unslung the heavy bandoliers of ammunition which I carried and leaned my rifle against the wall of the cavern. According to my pedometer, I had covered about ten miles. I secured a pencil and notebook from my pack and stepped to the mouth of the cavern to sight the directions of the peaks by which I had marked my landing.

I located them without any trouble and was engaged in trying to locate myself by a process of triangulation on a crude map which I had made of my morning's journey when an unfamiliar sound brought me up with a start. I listened intently and the sound faded for a moment only to increase in volume. I puzzled my brains as to what was causing it. It was a dull humming sound and the only thing it reminded me of was the whirling of an airplane propeller, a patent impossibility in Ulm.

The sound came nearer and I started back to the cave and took up my rifle when the cause of the noise came in sight. My flyer's ears had not misled me. Flying along at a moderate speed about a thousand feet above my level was an airplane. It was not of the conventional pattern with which I was familiar although it bore certain resemblance to the planes I had flown. The main difference was in the size and shape of the wings. Instead of the usual rectangular wing spread on each side of the fuselage, this machine had a single heart-shaped wing mounted above the fuselage with the point of the heart to the rear. Above the wing was a criss-cross network of wires which reminded me of an aerial.

The passenger car was long and cigar-shaped although it did not extend backward much beyond the point of the heart. The sides were pierced with windows which were glazed with glass or some other transparent material through which I fancied I could see figures moving, although the distance was too great for me to be sure.

The machine had three propellers, one mounted directly in front of the car and about on a level with the wing while the other two, which were smaller, were set lower and about midway from the center line of the craft to the extremities of the wing. Not only the small wing spread and other unconventional features of the design attracted my attention but also the complete absence of all motor noise although the three propellers were whirling rapidly.

Stupidly I watched the craft until it was almost overhead and then I had sense enough to start something. Even though the occupants of the ship were not handicapped by the roar of motors, I had no hope of making them hear at that elevation so I hastily took off my hat and waved it frantically. The airship moved serenely on without anyone seeing, or at any rate, heeding my signals of distress. Desperately I ransacked my brains for a means of attracting their attention and inspiration visited me. An old friend of mine had been experimenting with some illuminating bullets and he had given me a handful of cartridges loaded with them. I suddenly remembered that my pistol was loaded with them for I had intended to try them out but had forgotten to do so. Here was an excellent chance to test their value. I pulled my pistol from its holster and fired up into the air.

From the muzzle of the gun a bell of fire rose into the air. Up past the airship it went and still up. It must

have traveled fully eight hundred yards before the flame died. I fired again and then turned my attention to the airplane. My signal had evidently been seen, for the ship was swinging around on a wide arc. Again I waved my coat. There was no question that my signal was seen for the ship glided on a long slant toward the ground. I looked at the small open space before me and knew that it would be impossible to land an ordinary plane in it without a crash, but I had not yet learned the possibilities of that stubby ship with its diminutive wing spread. The plane curved down and came to a stop not over a hundred feet from where it first touched ground. The center propeller ceased turning but the two side propellers kept up a steady hum until after the ship had come to a complete stop.

A DOOR opened in the side of the ship and four figures climbed out and came toward me. I hastened to meet them but I stopped short in my stride before I had gone far. They had the general conformation of men but they suddenly gave me an uncanny feeling as though I were looking at huge spiders. I could not understand the feeling for a moment until I concentrated my attention on the one who was leading the advance. From his shoulders projected not one pair of arms but three. The rest of him appeared to be normal as well as I could tell through the bulky shapeless garment which he wore and the helmet which concealed his features:

The four figures spread out as they advanced and I did not interpret the action as a friendly one. I thought momentarily of retreating to the cave where I had left my rifle but I had no idea of how fast these newcomers could travel and they were as close to the cavern mouth as I was. I backed against a nearby boulder and drew my pistol. They might mean no harm but I preferred to be ready for all eventualities.

The four drew near until they were within twenty feet of me. I raised my pistol but hesitated about commencing hostilities until I was sure that they were not friendly. At my action they all stopped and stared and one of them raised an arm and pointed it at me. At this close distance I could see their features through the glass windows which formed the front of their helmets and I realized that they were like no men I had seen before. Their faces were a bright saffron yellow and their eyes were set obliquely in their heads. I raised my left hand in the universal gesture of peace and spoke.

"*Peheka oe, malahini!*" I said.

The leader looked doubtfully at me for a moment before he replied. He spoke in a strange guttural voice and while his language was not that of Ulm, I was able to understand it.

"Whence came you and what seek you here?" he demanded.

"I come from Ulm," I replied. "I came from the capital which is beleaguered by the race of the Mena and I am seeking to bring assistance to Kalu Sibama, my sovereign lord. I am lost and am trying to find my way thither. Can you direct me?"

"Ulm?" he said slowly and then burst into a harsh laugh. "You lie," he went on. "Ulm is more than a memory. Kalu Sibama has rested, well I hope, in the stomachs of the Mena for many moons."

"Is Ulm fallen?" I gasped, hardly able to believe my ears.

"Ulm is fallen," he said, evidently amused at my horror. "As fleas desert a dying dog, so her leaders deserted her. The Mena stormed the walls and but a remnant fought their way out. That remnant are slaves of my lord, Kapioma Sibama of the Empire of Kau. He will be pleased when I bring him two slaves in place of the one I was sent to seek."

His words answered my question as to his intentions. I thought grimly that he had not captured his slave yet as I carefully covered his chest with my pistol. The illuminating bullet struck him fair in the center of his chest and exploded in a flash of red light. He staggered back under the shock of impact but did not fall. I raised my pistol for a second shot but I never fired it. A flash of blinding green light came from one of his arms and my pistol clattered to the ground. My right arm hung numb and paralyzed from the shoulder. A second flash came and my left arm was in the same condition. I turned to run but I was too late. A dozen hands gripped me and held me helpless.

At a word from their leader, the three subordinates jerked me rudely along the ground toward the strange craft and pulled me inside. I gave a rapid glance around as I entered the craft for I desired to see what type of motors they had which operated so silently. There were none in sight. In the front of the long cabin were a set of dual flying controls of the type with which I was familiar. In the forward end were three tiny motors of an unfamiliar type but there were no batteries, no generators and above all no prime movers, unless such a term could be applied to a large panel board set with switches and dials which was between the two sets of controls. One man stood at this board. There were no other occupants of the ship evident at first glance.

My captors dragged me to the rear end of the cabin and forced me to a sitting position. Two more green flashes filled the interior of the cabin momentarily and my legs from the knee down were as useless as my arms were. The three retreated to the upper end of the cabin and divested themselves of their flying suits. They were men of middle height with rather slight physique but with high foreheads and an air of great intelligence. The leader turned his slanting eyes toward me. There was power in them and intelligence but there was also the very quintessence of cruelty in them. So obsessed was I with his face, that for a moment I failed to notice that four of his six arms had disappeared.

An explanation flashed through my mind and I looked at the rest of the crew. Each of them had only the normal two arms which I had expected. On the wall was a rack and hung there were five flying suits, from the shoulders of each of which projected three sets of arms. As I examined them more closely, I saw that only two arms on each suit ended in gloves. The other arms ended in hollow tubes from which the paralyzing rays had evidently come. The sight of these garments did as much as the coldly merciless faces to impress on my mind the fact that I was dealing, not with the brave chivalrous savages of Ulm, but with a race who had developed their mental powers highly and who were well acquainted with scientific laws.

The leader gave an order and two of the crew stepped to the flying controls. The man at the switchboard manipulated some dials. The ship started upward with a rocketing motion, climbing at what was, to my judgment, an entirely unsafe angle. However, the ship made

it without any difficulty and leveled off at an elevation of about a thousand feet and continued on her way east. I took a rapid glance at the compass set on the roof and mentally resolved to keep track of our course.

Two of the crew stepped forward and tossed to one side a piece of cloth which had covered some long object lying on the floor. They picked it up and I suppressed an exclamation with difficulty. The object was a man and it needed only a glance to tell me that he was of a different race from the crew of the ship. Long curling yellow locks fell from his head in place of the short black hair of the Kauans and his skin was as white as mine instead of the disgusting saffron yellow which marked our captors.

His arms and legs hung limp and useless as they picked him up and bore him aft. They dumped him unceremoniously on the floor beside me and returned to the forward part of the cabin. I looked at my fellow captive with interest, an interest which he quite evidently felt as well.

"Where from?" he asked me in an undertone. His voice had none of the guttural quality which marked the speech of the crew. It was as soft and liquid as the speech of any man of Ulm.

"Ulm," I replied, also in an undertone.

"But Ulm fell months ago," he said wonderingly. "Surely you did not survive the sack of the city. If you did, how have you survived since then?"

"I was not at the fall of the city," I replied. "I was away seeking aid for Ulm when it fell. I have just returned."

He looked at me curiously.

"What was your rank?" he demanded.

"I was Siba Tam," I replied proudly.

An expression of joy crossed his face.

"My hilt to your hand, Siba Tam," he said, "had I a sword to offer. I have long hoped for a sight of the son of my ruler."

"I was not the son of Kalu," I answered, "I was the husband of his only child."

"Still my hilt to your hand," he replied. "I have not seen my native land since I was a child but no more loyal subject of her Sibama lives. Do you wish to continue on to Kau?"

"I hardly wish to go anywhere as a slave," I said briefly.

"Then we can escape," he replied. "I had planned to try to win my freedom before we reached the city, although I had little hope of success. Two of us should be more than a match for five men of Kau."

"But my legs and arms are paralyzed," I objected.

"That is of no moment. Can you keep them quiet and simulate paralysis if I remove the effects of the ray?"

"I think so."

"Then be careful and do not move them while I work."

He rolled over and fell against me. The Kauans glanced around at him for a moment but paid no further attention. In a moment I felt a sharp pain in my back and then another in my shoulder.

"Now remain perfectly quiet," said my new friend. A dull whir sounded behind me for a moment and an excruciating pain racked my limbs. I bit my lip to keep from crying out. The pain passed and to my joy I found that both feeling and motion had been restored.



"What are your orders?" asked my fellow captive softly.

"I have no plans made. You know what to do much better than I do. Issue your orders and I will obey."

"Then when I give the word, leap to your feet and rush them," he said. "Get between them and their fighting suits and keep them away from them. If they get to their weapons, we are dead or worse. Without them they have nothing but their strength to rely on."

"Wait a moment," I said cautiously. "I think I have a weapon here. I have one that will kill ordinary men but it failed against these men. However, they had their fighting suits on when I tried it. Tell me, are they vulnerable to a sword thrust?"

"Without their fighting suits, yes; with them, no."

"Fine. Lie still and let me try my hand on them. Can you fly the ship after we capture it?"

"Certainly."

"All right, I'll see what I can do. If my weapon fails, we can still rush them with bare hands."

I braced myself for an effort. The distance was short and I felt sure that the little thirty-two automatic pistols which I had providentially armed myself with would be accurate enough for my purpose. Both rested in holsters—one under each arm.

With a sudden swift movement, I sprang to my feet, a pistol in each hand. I raised the right one and fired at the leader. I watched breathlessly for a moment. He swayed back and forth and then fell headlong. The gun was effective.

The other members of the crew stared stupidly at their fallen leader. Again the little gun spoke and the odds were reduced to three to two. The remaining members of the crew made a rush for their fighting suits but they never reached them. Three times the little automatic spat forth a message of death and each time my aim was good. My companion had risen to his feet and he now raced for the controls. He got them just in time for the pilotless ship was careening badly. In a moment he had it flying once more on a level keel.

**I** MADE the rounds of the prostrate crew. At short range the mushroom bullets with which my gun was loaded had done their work. Only one of our enemies lived and it was evident that his wound was fatal. Assured of their helplessness to harm us, I moved up to the control board.

"Which way, Siba Tam?"

I reflected before answering. There was no use in returning to fallen Ulm. The ship would be an excellent aid to me in pursuing my search for my lost princess and I had gained a loyal follower. The first step naturally was to arm him.

"Go back to the place where I was captured and then straight west for a few miles. In the meantime, teach me how to fly this ship. What is your motive power? I see no signs of any source of energy."

"Our power is drawn from the central power house in Kaulani."

"Radio transmission of power!" I gasped.

"I do not understand your words," he said (I had unconsciously spoken in English) "The power to turn our propellers and to actuate the fighting suits is generated in Kaulani and is sent out in the form of waves which are received by wires on the top of the ship."

"I noticed them," I replied, "but did not suspect their

use. I thought they were used to receive and probably transmit messages."

"Could messages be sent or received through them?"

"Certainly. Isn't that done?"

"No, Siba Tam."

"In that case we have one bit of knowledge that the Kauns don't have," I said cheerfully. "I will show you how it is done later. Now show me how to control the ship."

He motioned me to take the dual set of controls and started his explanations. It was ridiculously simple for one already well versed in flying and in five minutes I was maneuvering the ship like a veteran. The secret of the small wing spread and the short take-off and landing distance lay in the setting and position of the side propellers. They were so inclined that their blast struck the wings and gave a lifting effect to aid the take-off. Reversing them made them act as a brake and brought the craft to a standstill in a few feet. The central propeller did practically all the work of moving the ship forward.

In a short time we were over the place where I had been captured and we landed and secured my rifle and pack. We took off again and in ten minutes landed safely by the side of my adjuster.

"Now I will repay you for teaching me to fly our ship," I said with a smile, "by teaching you to manipulate a machine which I doubt if even the leader of that crew of brigands who captured us could understand. However, before I do so, tell me about yourself. Who are you and how did you get here? I have lived for years in Ulm and do not know your face and my face was not familiar to you."

"I was taken from Ulm as a child and reared in Kau."

"How did that happen?"

"My name is Olua; Olua Alii by right, for I was born the son of Muana Alii, one of the Council of Lords. When I was a child, I accompanied my father on a trip to Ame. On the way home, the Mena attacked us. My father was killed but I was saved alive and taken as a present to their chief. I was destined for his harder but he never saw me. On the way to his resting place, an airship like this one swooped down on us. The Mena fled in all directions. Men of Kau in fighting suits came from the ship and one of them, a great Alii, picked me up. His only son had died a few days before and for that reason he spared me, although the men of Kau are entirely without mercy in their dealings with those of other races. He took me to Kau and raised and educated me as his own child. There are few of the scientific secrets of Kau that I do not know."

"How did you come to be a prisoner?"

"Through loyalty to the land of my birth. Although raised in Kau, I never forgot that I was by birth an Alii of Ulm, one of the Council of Lords. I read all I could of Ulm and the more I learned of their bravery and chivalry, the more glad I became that I was one of them and not a treacherous Kauan. My loyalty was always to Kalu Sibama of Ulm and not Kapioma Sibama of Kau, although I did not speak openly of it."

"When Ulm fell to the Mena, a handful of the warriors of Ulm won their way through to the mountains between Kau and Ulm, where they were captured and brought as slaves to Kaulani. My heart leapt when I saw them come in. They were such men as I had always dreamed of, men who fought their enemies with steel



and not with weapons of stealth and treachery. The dream of my life was to rescue them and flee with them to Ame, which had not fallen to the Mena. I laid my plans carefully. I was going to capture one of the largest warships, and fly with them.

"The day before I was to act, I was betrayed. A faithful slave warned me that the Sibama's guards were on their way to arrest me. I did not delay, but raced for the roof of the power house, where I know that the Sibama's private flyers, the fastest craft in Kau, were kept. I selected a fast one-man flyer and fled in the night to the west. My flight was foredoomed to be a failure.

"The power sent out by the power house in Kaulani is sent in five wavelengths. One of them is used for all machines of peace, for lighting the house, preparing the food and similar uses. A second actuates the fighting suits and other weapons of war. The other three are assigned to the ships; one to commercial ships, one to war vessels and one to the Sibama's private flyers. All they had to do was to shut down the wavelength on which I was flying and my ship crashed to the ground, a wreck.

"By their meters at Kaulani they can tell where every ship is and warships were dispatched after me. They could not locate me. Before leaving, I had rigged the flyer with a device I had perfected, which made the meters give false readings and I was many miles from the place where they sought me, I hid the wreckage of my ship under rocks and eked out a precarious living in the hope that some day I would be able to capture a small flyer and make my way to Ame alone. I knew that they would use the paralyzing ray on me when I was found and I labored to make a pocket device which would remove the effects of the ray. After seven months of toil, I perfected it. The search for me had never ended, for the Kauans knew that I could not be beyond the limits of their empire. Many times I had seen the patrol vessels pass over me and each time I had hidden myself. This morning one passed and I deliberately showed myself. Everything went as I had planned. They paralyzed my arms and legs but my pocket neutralizer destroyed the effects. I simulated paralysis and was carried on the ship a prisoner. I bided my time and was about to attack, when they saw your signal and stopped to capture you. You know the rest."

"One question, Olua Ali; you said that the survivors of Ulm were taken to Kaulani. Were there any women among them?"

"There were not, Siba Tam. They were all warriors."

**E**VIDENTLY Awlo and Lanu had not made their way to Ulm. Well, that was about what I had expected.

"Perhaps you had better teach me to use one of these fighting suits," I suggested.

"Certainly, Siba Tam, whatever you desire. As you can see, each suit has six arms. Two of these are control arms, the other four are weapons. Each of the weapons is different. The green ray is a paralyzing ray with whose effects you are familiar. It can be used as a crippling weapon or as a killing weapon. If the heart is paralyzed, death ensues instantly.

"In the second arm is an orange ray which neutralizes the effect of the green ray. It is used as a defensive weapon against an enemy equipped with the green para-

lyzing ray. It will also restore the functioning of any part of the body which has been paralyzed. The third arm contains a red or heat ray. I will show you the effect of it."

He donned a suit and directed the middle arm on the left side toward a boulder. A ray of intolerable brightness shot from the arm. The granite boulder glowed bright for a moment and a stream of molten rock ran down its face. Olua shut off the ray.

"The fourth ray is a blue one which has the effect of neutralizing the red ray of an opponent," he went on. "You see, each suit is equipped with two offensive and two defensive weapons. These are all that the common soldiers carry. The Alii have suits with more arms and more deadly weapons, both offensive and defensive. It is said that Kapioma Sibama has made a suit with forty arms but it is so heavy that he cannot walk with it on. It operates, not on the usual wavelength, but on the private wavelength on which his flyers operate.

"That, however, is not the most effective suit in Kaulani. The most deadly suit is one which I manufactured in secret and which is hidden there. I had no opportunity to bring it with me or all the forces of Kau could not have harmed me. I will tell you, Siba Tam, where it is concealed. The knowledge may never benefit you but it will do you no harm. In the power house is a laboratory where fighting suits are made and tested. One entire end of the laboratory is taken up by a screen against which all rays are helpless. Unknown to everyone, I have tampered with that screen. If you ever wish to get the suit, go to the laboratory and turn the ordinary red ray, the heat ray of the common suits, against the upper corner of the screen, fourteen inches from the top and eleven inches from the left end. Leave the ray on full force for eight seconds and then apply the orange ray for twelve seconds. A portion of the screen will open and the suit is behind it. It operates on the same wave as Kapioma's."

"Thank you, Olua," I said, after I had practised with one of the suits until I could manipulate it rapidly, "you have told me what I wished to know very frankly and fully. I will reward your confidence by being equally frank with you. Although I am Siba Tam of Ulm, I was not born in that empire. I was born in a much larger world. Do you understand the composition of matter?"

I soon found that the education of an Ali of Kau left little to be desired from a scientific standpoint. Olua was perfectly familiar with the division of matter into molecules and atoms and of the atoms into protons and electrons. One of his statements surprised me a great deal until I had time to reflect on it. He said that the atoms were static instead of in motion and that the same was true of the electrons. I started to correct him, when a sudden thought made me pause. A moment of reflection told me that he was right. In his plane, both atoms and electrons were static.

When I had first started my electronic vibration adjuster, which reduced the amplitude of vibration of the electrons, my switch had jammed and I had broken it in trying to open it. Despite this fact, the adjuster had reduced me to the size of the men of Ulm and had then ceased operation. On each subsequent trip, the same phenomenon had occurred. The reason, on reflection, was obvious. I had reduced the amplitude of vibration to zero and in this minute plane, the electrons did not vibrate.

Once I had that idea in my head, it was a simple matter to explain to Olua the theory of the vibrating atoms of the larger planes. He did not question my theory of simple harmonic vibration of the electrons, which theory had brought so much ridicule on me at one time. He realized at once how the size of a body could be increased under such circumstances but when I told him of the world from which I had first come to Ulm, his eyes opened. He had no more idea of the existence of such a world than we of the larger plane had of the existence of Ulm before my first trip there. His first thought was to flee to the larger plane from the pursuing Kauans.

"There we will be safe," he said. "They will be after us in a few hours with ships of greater speed equipped with fighting suits against which we have no defense."

"You may go if you wish Olua," I said, "but I have returned to Ulm for a purpose and that purpose has not been accomplished. I will stay and continue my search."

"Where the Siba Tam of Ulm stays, there stays Olua Alij of Ulm," he said quietly. "What are your plans?"

"The only place where I can obtain the information I seek is at Kaulani, where the survivors of Ulm are," I replied. "Let me tell you why I am here and what I seek."

In a few words I told him of Lamu's treachery and of my search for my lost princess.

"You will not find her in Kaulani," he said thoughtfully, "for there were no women brought there. However, some of the prisoners can tell you whether they returned to Ulm before it fell. Since that is your desire, we will wait here until the Kauans come and capture us."

"No, we won't," I replied. "If they come here, they will capture not only us but also my adjuster and the weapons I brought from the larger plane. How long will it be before they are after us?"

"At least four hours."

"Good. In that length of time, I can teach you how to manipulate a rifle and a pistol as well as the adjuster. There is one other thing you want to learn to use. Here is a wireless transmission set. It will enable you to send messages through the air, which a similar instrument will receive, and also to receive messages sent to you. If I can, I will construct one in Kaulani so that we can get into communication. You are not going back to Kaulani with me."

"I will stay with my lord."

"You will obey my orders. If you go there, it will not aid me at all and will result in your death. If you hide out here, it is possible that you may aid me. In the event that I am killed, it is my order that you take up the search for Awlo of Ulm and never abandon it while you live until you have rescued her from Lamu or have looked on her dead body. Do you understand?"

"I do, sire. It will be as you order."

"Good. Now I want to teach you all I can before we have to pull out of here."

Olua was an apt pupil and in two hours he was able to manipulate a rifle and a pistol as well as I could and even to shoot fairly well at short ranges. The weapons would be useless against men equipped with fighting suits, the simplest of which threw about the wearer a repulsive screen which no bullet could penetrate, but I felt that no knowledge was useless, since my ability with

a pistol had saved us once. The radio set was elementary to him, his only wonder being that no Kauan had ever thought of so simple a device.

When he was fully instructed we entered the adjuster and increased our size slowly until we were perhaps a hundred yards tall, compared to Ulm standards. We stepped out and I used a rifle to start the adjuster and let it reduce its size to Ulmite standards. When this was done, I could pick it and its entire load up and carry it without difficulty. Olua picked up the Kauan ship and together we set out across the hills for the point where I was captured. I resolved to make that cavern our base of operations.

We found it with no trouble and reduced ourselves to our former dimensions. It was quite a task for us to move the adjuster and its load into the cavern but we did so. When the task was completed, I bade a temporary farewell to Olua and entered the Kauan ship. I drove it about thirty miles due east and then landed. I set the controls of the ship for a maximum climb and pulled the power lever to full speed forward. The ship sprang up into the air and I leaped out just in time. Upward it went for several miles before it fell out of control. When it did, it gave a sickening lurch or two and then dove at full speed toward the ground. I sat down and waited for the next Kauan ship to appear.

**I** DID not have long to wait. In less than an hour a speck appeared in the blue to the east. The new ship was a larger one than the first and it seemed to me to be traveling at a higher speed. I was fearful lest the occupants would see the remains of the ship which had crashed but the Gods of Fate were kind to me and it escaped their notice. It probably dove into some deep dark ravine, for none of the scouts which went out from Kau in search of it ever located it. Hunting for so small an object as a five-man cruiser in the wastes of the Kau mountains was a great deal like the proverbial search for a needle in a haystack.

When the ship came in sight, I walked slowly out into the open and stood quietly awaiting its approach. I thought, and as it turned out I thought rightly, that the figure of a man would hardly escape the attention of an airship sent out to seek for one. The ship swung down on a long slant and came to a standstill less than fifty feet from where I stood. A door opened in the side of the cabin and a half a dozen figures wearing eight-armed fighting suits emerged. I advanced toward them confidently.

"Greetings, men of Kau," I said when I had approached to within twenty feet of them. They paused and their leader stepped a pace in front.

"Greetings, man of Ulm," he replied in his guttural voice. "What seek you in the mountains of Kau?"

"I seek audience with Kapioma Sibama of Kau," I said. "The way to Kaulani is long and weary and I ask your aid in traveling there."

"What manner of man are you?" he demanded. "Your color and speech mark you as a man of Ulm, yet what man of Ulm knows of Kau and Kaulani?"

"I know many things," I said haughtily, "things which I have come to Kau to impart to your Sibama."

"What is your name and rank?"

"I am Courtney Siba Tam, Crown Prince of Ulm."

A peculiar expression flickered for a moment over his face and he bowed low to me.

"Neimeha of Kau is honored to be of service to such a one," he said smoothly. "My poor ship is at your Highness' disposal to carry him to the court of Kapioma Sibama. There you may meet some of your compatriots."

"I believe that a few of my subjects did escape into the Kau mountains when Ulm fell," I said carelessly, "and I would like to see them again. I will mention your courtesy to Kapioma Sibama."

He bowed again at my words and motioned to me to precede him into the flyer. I did so, expecting every moment to feel a paralyzing ray strike me, but evidently my bluff had worked. Neimeha followed me in and he and his followers divested themselves of their fighting suits.

"It is fortunate for me that you took this path," I said cheerfully. "I had little hope of meeting a ship so soon."

"We seek one who has fled from Kau," he replied. "As long as the light holds we will continue our search. Such were my orders."

"It is unfortunate that you men of Kau do not understand some of the laws of nature with which I am familiar," I said. "If you were, it would be a simple matter to communicate with your sovereign and ask for a modification of your orders. The waves which come from your power house could easily carry a message to you."

"How would such a thing be possible?" demanded Neimeha in amazement.

I smiled enigmatically.

"It is but one of the things which I can teach you," I replied. "I could instruct one of your learning in a short time, but I do not choose to do so. Perhaps your Sibama will desire to confine this new knowledge to his Alii. How long will it take us to fly to Kaulani?"

He turned to a map hanging on the wall and I walked over and studied it. It was the first map of the submicroscopic country I had ever seen, for Ulm had not progressed to the stage of map making and probably never would have. The Ulmites were possessed of an uncanny sense of direction which enabled them to find their way readily about their domain without other aid.

I had been captured in what was apparently a "no man's land" between the empires of Ulm and Kau. Ulm lay, as nearly as I could scale distances by the eye, about ninety miles *due west* of where we were. The old legend had lied after all. Kaulani was roughly two hundred miles to the east, a hundred and fifty of which were over barren mountains.

"We can fly to Kaulani in an hour and a half," said Neimeha. "In view of your presence, I am going to alter my instructions on my own initiative and take you directly to the city."

"I thank you," I said. "I am fairly familiar with this type of ship. With your permission, I will take the dual set of controls and guide the ship a part of the way."

He nodded and for the rest of the trip I devoted my attention to improving my technique. There was really nothing to it and long before we reached Kaulani, I was as confident of my ability to fly any ship in the country as I was of my ability to fly a Bach or a Douglas.

IT was nearly dark when we landed in Kaulani. The plan of the city resembled the plan of Ulm, but the architecture was of a much lighter and more graceful type. Not that Ulm had not been a beautiful city but

its beauty was the beauty of grandeur and massiveness with utter simplicity marking its architectural lines. Kaulani, as well as I could tell in the gathering dusk, was made up of buildings of a much more graceful style. I could not place the type of architecture, although in the daylight it had a strong note of the best Grecian style in it.

We landed in the huge grounds surrounding the royal palace. Neimeha and two of his guards escorted me into the palace to a floor below the level of the ground.

"I am placing you in the slave's quarters," he explained, "not that your status as a guest has changed, but that it is necessary that you be kept under surveillance, until it is learned whether Kapioma Sibama will receive you. The slave's quarters are the only place where this can be done. Besides, I thought that you might like to see some of your old subjects," he added with a touch of malice in his voice.

The room into which I stepped was the central recreation room of a large suite of rooms. It was well lighted and ventilated and was fitted with a number of comfortable looking chairs and divans. At the far end of the room a half dozen men clothed in coarse white garments were grouped together talking. They turned as I entered and surveyed me from head to foot. As I approached them, one stepped in front of the rest and looked at me keenly. I suddenly became aware that I was dressed in corduroy breeches and a flannel shirt and not in the gorgeous robes of the Crown Prince of Ulm with the diadem indicative of my royal rank blazing on my brow. These garments were not suitable for rough work and I had left them at my adjuster in the care of Olua. With as much of an air of dignity as I could command, I stepped forward to face the group. Suddenly I recognized the man who had stepped forward.

"Moka!" I shouted with joy. It was indeed Moka Alii, Lord Chamberlain of Kalu's court.

The old nobleman stared at me in unbelief for a moment and then a red flush stole over his haughty face. Pointedly he turned his back on me.

"Moka!" I cried again, "Don't you remember me? I am Courtney Siba Tam, your prince; Courtney Sibama, if Olua spoke the truth when he said that Kalu Sibama was no more."

Moka turned and faced me coldly, entirely ignoring my outstretched hand.

"I recognize you, Courtney," he said in a biting tone, carefully avoiding giving me any title, "to my regret, but my lips will never touch the hand of a traitor, though I be boiled in oil for my refusal!"

"Moka!" I cried in real anguish, for the coldness of the first friend I had made in Ulm cut me to the heart. "It is not true. I am no traitor to Ulm. I was delayed in my task and was on my way to Ulm with aid when I learned that it had fallen. I surrendered to the Kauans and hastened here to bring what aid and comfort I could to those of my subjects who still lived. Never have I deserted Ulm and never has the thought of her welfare been absent from my thoughts."

"Traitor! Doubly dyed traitor!" said Moka slowly and bitingly, "and now, it seems, liar to boot! Well, I know the plan with which you left Ulm. You planned to aid her enemies and to depose Kalu Sibama, your lord, and reign in his stead. Thankful I am that Kalu, who foolishly loved you, died before he knew of your treachery."

"I am no traitor, Moka," I cried, "and who says I am, lies in his throat! Hold up, old friend," I exclaimed as he sprang at me, "I am not hitting at you but at the one who told you this pack of lies. Where did you learn what you thought were my plans?"

"Your smooth tongue, which deluded Kalu Sibama, will not avail you, Courtney," he said coldly. "Cover your face in confusion and learn that your treachery was told by Lamu Siba, whom you tried to corrupt and failed."

"Lamu!" I gasped—"Did Lamu return to Ulm?"

"He is here and he has told of the plans which you broached to him to destroy Kalu and of how he fled from you when he learned of your baseness. Your treachery is proven indeed, Courtney."

"So he got back to Ulm safely," I said. Somehow I had always had an idea that he must have missed the city as I did and thought that he and Awlo were wandering somewhere in the submicroscopic world. The news that he had reached Ulm and had managed to turn my friends against me was a bitter blow for it could mean only one thing, that Awlo was dead. Had she been alive, he could never have told that tale and been believed. With a sinking heart I put my next question.

"What of Awlo?" I asked.

I reeled back as Moka struck me a blow on the mouth. "Dog!" he cried. "The name of a Sibama of Ulm must not be uttered by the lips of a perjured traitor! To complete your confusion, I will tell you that the Sibama of Ulm is in Kaulani."

"Said she that I was a traitor?" I demanded bitterly. Moka paused.

"No," he admitted slowly, "she did not, but it is unnecessary. Lamu Siba has told enough. We men of Ulm need no word from her to damn you further."

My heart leaped with joy at the thought that Awlo was alive and in the same city with me, and while her silence was inexplicable, I knew that she must have some good reason for it. Awlo knew that I was no traitor to Ulm and I would have staked my life on her love and loyalty.

"Listen, old friend," I said to Moka, "it was never your way to condemn a man unheard in his own defense on the testimony of his enemies. You have known me as your lord and as your friend for years; have you ever known me to speak an untruth?"

"No," he admitted.

"Then listen, old friend, while I tell you the truth. Lamu Siba is the traitor, not I."

Rapidly, but in great detail, I told him all that had happened since the fatal day when I left Ulm in my adjuster with Awlo and Lamu to bring back the guns and ammunition with which I hoped to rout, if not destroy the besieging Mena. I told how Lamu had learned to operate the adjuster, how he had stolen my princess and had fled with her, leaving me desolate. I told of my struggle to get material and of the months of feverish work while I had constructed a duplicate of my machine and gone in pursuit. Last, I told of how I had landed with my guns and ammunition and had met Olua and how I had surrendered to the Kauans in order to be brought to Kaulani.

**MOKA'S** face grew graver as my story progressed. My sincerity almost convinced him, but for months he had thought me a traitor. The struggle was evident

in his face. He wanted to believe and yet could not. When I had ended my tale and again held out my hand to him, he hesitated, but another of the auditors, a young officer named Hiko, who had at one time been my personal aide, had no doubts.

"My sword to your hand, Courtney Sibama!" he cried, as he dropped on one knee and pressed my hand against his forehead and then to his lips. "My life is yours to command!"

His enthusiasm carried the day and in a moment, not only Moka, but the rest of the group were on their knees professing their loyalty to me.

"Forgive me for doubting you, Courtney Sibama," cried Moka with tears in his voice, "but the words of a Siba carry weight."

"Where is my Sibimi?" I demanded.

"Alas, my lord," said Moka, "she is a prisoner in the palace of Kapioma Sibama, Lord of Kau. I have seen her twice but none of us has ever spoken to her."

"Did you not speak to her in Ulm?" I asked.

"No, my lord. She or Lamu never returned to Ulm. Four months after you left us, Ulm fell to a night assault of the Mena. Had you been there, it would never have happened, but discipline was relaxed after you left and they kept watch poorly. Besides, the Mena had never before attacked at night.

"The city was given over to slaughter, but a remnant of the royal guard gathered about the palace of the Sibama and we held them at bay for eight days. At the end of that time they fired the palace and we fought our way out hardly. Both Kalu and the Sibimi were killed and most of the guards, but a few of us held together and fought our way toward the waste places where we hoped the kahumas, who were said to rule, would either defend us or kill us with honor.

"The Mena ringed us about and mile by mile our numbers lessened. There were but a hundred and twenty left and many of them sore wounded when the pressure of the Mena suddenly ceased and we saw them flying like leaves before a gale. We heard a strange noise overhead and looked up and saw a multitude of strange birds flying over us. Some of these birds lit near us and disgorged men with many arms who took us prisoners and dragged us into the interior of the birds. We thought they were kahumas. When they were in the birds they divested themselves of all their arms but two and we prepared for death. They did not kill us but saved us alive and brought us here to Kaulani.

"We had been here about a month when we learned that an Alii of Kau had planned to rescue us. We rejoiced but his plot failed and he had to flee for his life. Two months later Kalu Siba was brought to us as a slave. He told us a tale of treachery on your part and of how he and Awlo Sibimi had fled from you but had been captured in the waste places of Kau. Him we foolishly believed, the more because Awlo Sibimi was a prisoner in the palace of Kapioma and none of us could speak with her.

"Aside from the fact that we are slaves and not free men, we have no complaint. The kahumas have treated us well and mercifully, although we are forced to labor, and dire is the punishment of one who shirks. We hope that our condition will be improved for Kapioma means to make Awlo his Sibimi as soon as the present one is killed."

"Is killed?" I echoed.

"Yes. The kahumas have a barbarous custom in Kau. A Sibimi is chosen and in one year, unless she is with child, she is slain and a new one is chosen. The present Sibimi dies in a month. Thinking you dead, Kapioma meant to make Awlo Sibimi of Kau. Hark! Here come the others from work. Hide behind us for a moment, Courtney Sibama, until I tell them of your presence."

I knew the love of the men of Ulm for dramatic scenes and I stepped behind the ranks of my followers. The door opened and in trooped a hundred men, all attired alike, in the coarse white garb which is the Kauan mark of a slave. Moka stepped forward and held up his hand for silence.

"We harbor in our midst a traitor!" he cried dramatically. "One who is a traitor to his Sibama, a worse traitor to his Sibimi and a traitor to Ulm. What is the punishment for such a one?"

"Death!" came a cry from the men of Ulm. Lamu stepped forward and confronted Moka.

"Death is his punishment and it shall be meted out when he is known," he said. "Name this traitor."

This was the answer that Moka had hoped for. He drew himself up to his full height and pointed his finger dramatically at the prince.

"Thou art the man!" he thundered. "On your knees and beg for mercy from Courtney, Sibama of Ulm!"

Taking my cue from his words I stepped forward into full view. Lamu started and turned pale as he saw me, but an ominous growl rose from the rest.

"What means this, Moka?" demanded one of them. I recognized the man as Hama Alii, a noble of Ulm and one of the Council of Lords. He was, if my memory did not play me false, a distant cousin of Lamu's. "Courtney is a traitor, as we all well know. To him shall the sentence of death be meted out."

A murmur of assent came from the ranks of the Ulmites behind him and my handful of followers closed up behind me.

"Slay him!" cried Lamu pointing at me. The crowd surged forward.

"Hold!" I cried and they paused for a moment. "Every man is entitled to a hearing. Let me tell my tale and then let the Council of Lords judge my tale. One of royal blood may be tried only by that tribunal."

My point was well taken and it appealed to the justice of the men and a cry of assent went up. Briefly, and as eloquently as I could, I retold my story. It made an impression but there was no loyal aide to turn the tables in my favor this time and at the end of my speech there was silence for a moment.

"It is a lie!" cried Lamu suddenly. "Kill the traitor and make an end of it."

There was a murmur, half of assent and half of dissent and I played the same card again.

"How many of the Council of Lords of Ulm are here?" I asked.

"Hama Alii and I," replied Moka.

"A matter of touching the royal family of Ulm can be decided only by the Council of Lords," I insisted. "Neither Lamu Siba nor I can be tried by any lesser tribunal. Let Hama and Moka decide."

THERE was a roar of assent to my proposition and the two nobles retired into a corner to talk the matter over. For half an hour they argued the matter back

and forth. Knowing Hama's relation to Lamu, I had rather expected a deadlock and that was what eventually happened. The two came forward and Moka, as the elder, announced their decision.

"When the Council of Lords is evenly divided, the decision rests with the Sibama," he said, "but here the Sibama is an interested party and it would not be fair to let him decide the matter, for traitor or not, Courtney is Sibama of Ulm until the Council of Lords declare the throne vacant. Both Courtney Sibama and Lamu Siba have spoken and the voice of each sounds as that of a true man in our ears. It is our decision that Courtney Sibama and Lamu Siba be each given the honors of their rank and both held blameless, until the matter can be laid before the Sibimi for decision. In the meantime, the disputants shall swear friendship to one another for the time being, and we will all live in harmony as becomes brothers in misfortune."

Lamu and I looked speculatively at one another. After all, there was nothing that we could do except agree with the decision, which was manifestly a just one. I knew that once Awlo spoke, the question would be settled and he doubtless hoped that she would get no chance to speak or else he had another idea in the back of his head. At any rate, he spoke first.

"The Prince of Ame defers to the Council," he said. "As Moka Ali has spoken, so shall it be."

"So shall it be," I echoed.

As Lamu and I approached one another for the ceremony of swearing temporary friendship, there came an interruption. The door opened and there stood Neimeha with a detachment of guards.

"Courtney Sibama," he said, "Kapioma Sibama requires your presence in his throne room."

With a shrug of my shoulders I followed him out of the slaves' quarters and to the ground floor of the palace. The building was a beautiful one, much more ornate than Kalu's palace in Ulm, but what it gained in beauty, to my mind at least, it lost in grandeur. At the door of the throne room we were challenged, but a word from Neimeha opened a way for us.

The scene was very similar to one of the dozens of Kalu's audiences I had taken part in. On all sides blazed the colors of the nobles and ladies, their flashing gems set off by the sombre black worn by the guards. The throne room was long and impressive, with a dais at the head bearing four thrones, the central two of which were occupied. Kapioma Sibama of Kau was a tall, slender man of about my age. He had a splendid breadth of forehead but his slanting eyes, like those of all the Kauans, were mercilessly cold and cruel. The first thing, however, that attracted my attention was the sadness of the face of the Sibimi who sat beside him. She was a slim young girl and despite her yellow skin, was beautiful, but the sadness of the ages was in her tragic eyes. Suddenly I remembered what Moka had told me of the customs of Kau and I realized that she saw death before her in a few short weeks. I squared my shoulders and advanced to the foot of the dais. Slave or prisoner, condemned to death, I might come from that interview, but as Sibama of Ulm I would go to it. I looked Kapioma squarely in the eye and he returned my gaze with an expressionless face.

"Courtney of Ulm," he said in a guttural voice, "Neimeha tells me that the wonders we have heard of you are true and that your subjects in Ulm looked on



you as a powerful kahuma because you knew more of nature and her laws than they dreamed of. You are no barbarian of Ulm, fit only to be a slave, but a man of intelligence and learning. He tells me that you are able to navigate a flyer."

I bowed without speaking.

"I am duly sensible of the misfortunes which have thrown you from your high position, where you might with propriety have sat by my side, and it is not my desire to add to the burdens or sorrows of a man of royal rank. Since you are able to take your part in this community as an equal with my nobles, it is in my mind to create you an Alii of Kau and attach you to my court."

Again I bowed deeply in silence.

"Neimeha tells me further that you know ways of sending messages through the air from the power house to a ship many miles away."

"I do, sire, it is a relatively simple matter."

"I am glad to hear it, for I believe that the art will be of much use. To the rank of Alii of Kau I will raise you, but in return I will ask of you one small favor."

"I will be glad to put my knowledge at your service," I replied.

He frowned slightly at my answer.

"It is not that; that I took for granted. The favor I ask of you is of a different nature. You were married in Ulm to Awlo, daughter of Kalu Sibama. Since his death she is now Sibimi of Ulm. In a month or so," here he paused and shot a glance at the Sibimi, who quailed under it as though under a lash, "there will be no Sibimi in Kau and it is my intention to elevate the daughter of Kalu to that exalted rank in lieu of the throne she has lost. The favor I ask of you is that you divorce her."

"Divorce Awlo? Never!" I cried.

"You had better consider well before you decide so," he said with a frown. "As the wife of an Alii, I could not marry her without first getting rid of you. Were I to order your execution, I would be no better off, for the widow of an executed criminal could not be elevated to the rank of Sibimi. However, under the laws of Kau, a slave may not legally have a wife. Unless you consent, I will degrade you to the position of a slave, which will effectually dissolve the tie which binds her and leave her free to mount the throne by my side. It is immaterial to me, but it means much to you. You may have a day in which to decide. Either you become an Alii of Kau and divorce her, or you become a slave of Kau and I will marry her in either event."

"It doesn't take a day or a minute to decide that, Kapioma Sibama," I replied, "I will never divorce her."

He shrugged his shoulders.

"At any rate, I tried to be kind to you," he replied.

"Neimeha, this man is a slave of Kau. Clothe him as such and take him to the slaves' quarters. He will work in the laboratory of the power house and show us a method of sending messages to our ships, which he boasts is so simple. If he refuses, or fails, flay him alive."

The guards seized me and half dragged and half led me from the throne room. Once outside the room, my clothing was stripped from me and the white garb of a slave thrown over my shoulders. Thus dressed, I was led back to the slaves' quarters which I had left a short time before. Moka and my other friends hastened to greet me and to express their indignation at the tale I

had to tell. They applauded my action vociferously, although Lamu suggested that it might have been a good plan for me to have fallen in with Kapioma's plan and won the rank of Alii, which might have enabled me to aid all of them to escape. A withering glance from Moka stopped his mouth. After a short talk we dispersed to our beds in the dormitories attached to the central room.

I lay awake for some time making my plans. So far everything had fallen out better than I had dared to hope. Awlo was alive and well and in no immediate peril. I had a hundred loyal friends at my back and best of all, I was assigned to work in the laboratory to construct a wireless set, the very thing I needed to communicate with Olua with. I dropped to sleep with a feeling that fortune was favoring me.

When the slaves were turned out for work the next morning, a guard was waiting for me. He took me to the power plant, which was located in the grounds of the royal palace. I was taken to the laboratory and told shortly to show how I proposed to send messages over power waves. I protested that I was unfamiliar with their methods of power transmission and that I would have to familiarize myself with their methods and equipment before I could be expected to show them anything new. After a consultation, my stand was decided to be a reasonable one and I was handed over to one of the laboratory men with orders that I be taught all that could be taught about power transmission.

My guide and instructor was a young man, about my own age. Despite his slant eyes and yellow skin, he proved to me quite a likeable fellow as well as an erudite scientist. He was a son of one of the higher Alii of Kau. During the period I worked with him, we became in a measure friends and he confided to me one day that one of his great-grandmothers had been a slave brought from Ame, the second city of the empire of Ulm. This probably accounted for the fact that he showed less interest in science and more in human beings than most of his compatriots. Altogether, I found him the most human and likeable person I met among the Kauans. Only the fact that he was passionately loyal to Kapioma prevented me from approaching Waimua, which was his name, on the subject of joining forces with us. His tragic death later was a source of lasting sorrow to me.

I HAD little trouble following Waimua's explanations.

The power for the entire empire of Kau was generated in the one building in Kaulani and was sent out broadcast for general use. There were five distinct and separate installations, each sending out one of the five wave-lengths earlier described to me by Olua. I was appalled at first by the enormous waste of energy involved in general broadcasting until I found out that only a low-power pilot wave was so sent out. The generators were so built that when a demand was received by the pilot wave, a directional wave of the proper power was automatically sent out to fill the demand. Meters registered the direction and distance from the power house of the consumption and, as a result, the location of any ship flying over the empire could be plotted to within a dozen miles on a map hung near the flying broadcasters. The smallest installation of the five was naturally the one on which the Sibama's private flyers and his fighting suits were operated.

The day passed before we were half through with the power installation but I took the time to give Waimua a rough outline of the methods of radio telegraphy. He understood the principle at once and promised to assemble everything we needed for our experiments and start the best instrument makers in the empire making tubes according to my specifications. As soon as the needed equipment could be got together, we would be in a position to start our experiments. I readily located the screen in the laboratory, behind which Olua had hid his fighting suit, but naturally I made no attempt to get possession of it and did not mention its existence to Waimua.

While I was going over the power plant, a germ of an idea came to me, which seemed to make our escape not altogether impossible. While I had no intention to strike before I had established communication with Olua and given him orders as to the part he was to play in it, nevertheless, I broached the idea to Moka in strict confidence. He promptly promised to see that our men gathered as promptly as possible certain information which I needed. He proposed to speak at first only to the most discreet and trustworthy of our men and avoid giving out information until the time came for action. As we were not interrupted that night, the remnant of the Council of Lords decided that the moment was propitious and Lamu and I swore a temporary oath of friendship.

The next day I finished my course of instruction and on the third day the instrument makers presented for my approval a dozen radio tubes which they had manufactured. Considering the fact that they had never seen a small tube for the sending of messages, they had done a very creditable job and I had little doubt of the success of my efforts. Waimua and I at once started assembling a transmitter and two receivers. One of the receivers was constructed to work only on one definite wavelength, but the other was made adjustable, so that I could not only receive from my own transmitter but also from Olua, if I finally established communication with him. A week passed before I was ready to make a test.

The receivers worked all right while they were in the room with the transmitter and on the pretext of testing them at a longer distance, I sent Waimua fifty miles away in a military flyer. As soon as he was out of the way, I set my transmitter to the wavelength of the receiver on the adjuster and called frantically. It seemed hours before an answer came. Olua had diligently studied the international code since I had left him and he had no difficulty in receiving my messages and answering them. I quickly acquainted him with the state of affairs in Kau and told him of our plans. He was able to make some excellent suggestions, based on his knowledge of Kaulani, suggestions which I gladly fitted into my plans. On the off-chance that they might be useful, I directed him to make a trip to the larger plane in the adjuster and bring back certain supplies. I had left quite a sum in gold in my hidden Nevada valley and I told him where to find it. He promised faithful performance of his duties and I turned to the wavelength on which the receiver, which Waimua was carrying, was set.

I sent out a garbled message, varying my power from time to time so that the signals would come in strong and then fade out, I was fairly sure that Waimua would

be able to get only a few words of the message, yet he would feel much encouraged. By means of a proposed modification, I intended to prolong the work for a few more days until we were ready to strike for freedom. My plan worked perfectly and Waimua came back wildly enthusiastic about the partial success we had achieved on our first attempt. We tore down both the receivers and the transmitters and proposed rebuilding them with slight modifications, which I assured him would make them entirely successful.

That night Moka reported that Hiko had brought in the last bit of information we had needed and there was no need to delay longer. Everyone, even Lamu, had by this time been informed of the plan and of the part assigned to him in carrying it out.

**B**RIEFLY, our plan was this. At a given time, we were to divide into two bands. One band, under my personal leadership, was to attack the power house and shut off all power. As soon as this was done, the remainder, under the command of Moka, was to enter the palace and secure Awlo. The rest of us would sally out and meet them and we would all take refuge in the power house. We expected to capture several of the Kauan scientists in the power plant and we would force them to modify a hundred-man military flyer, which was always kept in a hangar on the roof of the power house, to fly on the Sibama's private wave-length. We would disable all generating units except the small one which sent out this power. All but a picked detail were then to leave on this modified ship and the devoted band who remained would try to hold the power plant until we were well away from Kau.

The plan was a risky one but it was the best we could think of and I resolutely refused to allow any discussion of what would happen after those staying behind had been overpowered and our ship brought to the ground. I had another plan, which I did not divulge, even to Moka. I meant to head for my adjuster and arm my band. Kau had no firearms so far as any of us had seen and before a hundred well-armed and resolute men, the entire army of Kau would be helpless, once their fighting suits were put out of business by the shutting off of the power which actuated them. What we would do after our escape would depend on Awlo's wishes. We might wipe out the Mena and refound the empire of Ulm (Ame had not yet fallen to the Mena so far as we knew), or we might found a new empire in some remote part of our tiny world some place where neither the Mena nor the Kauhans would find us.

The weakest part of our plan was the fact that we were forced to strike in broad daylight, for we were locked in at night. This could not be helped, however, and we set high noon for our attempt. We trusted to the surprise and to the fact that many of the palace attendants would be at lunch. When we left our quarters in the morning, I could not help wondering how many of my brave subjects would be alive that night.

About ten o'clock, as Waimua and I were working away at the radio transmitter, two guards appeared in the laboratory and ordered me to follow them. They refused to answer any questions, merely stating that I was wanted at once in the throne room. With a few words of instruction to Waimua, I took my place between them and walked out. As we emerged from the power house, I saw that something had gone wrong

with our plans. Between rows of guards wearing fighting suits, the Ulmites were being herded to the slave's quarters. I was taken to the door of the throne room, where I found Lamu, Moka, and Hama all waiting under guard. The door opened and I was ordered to enter the presence of the Sibama. Shaking off the hands of my guards, I walked with my head up, to the foot of the dais and stared defiantly at Kapioma. He stared back at me with an expressionless face.

"I have been informed, Courtney," he said in his guttural voice, "that there is a plot on foot among the slaves from Ulm to capture the power plant and then to escape in a military flyer, with you at the controls. What have you to say?"

"Nothing, sire," I replied briefly.

"All of the details of the plot are in my hands," he went on, "and any denial would be useless. As the ringleader, your fate is naturally death. What form it will take, I have not yet decided, nor has my Council of Lords yet debated the fate of your followers."

"Of course, I realized long ago that you had decided on my death, Kapioma Sibama," I said coldly, "since only thus can you free Awlo from her bonds to me. The laws of Kau may say what they please about a slave but we were wed by the laws of Ulm when I was free and a Prince. My enslaving does not dissolve the tie which may be set aside only by the Sibama of Ulm with the consent of his Council of Lords. I would like to know how you learned of our plan."

"One of your members, whom you basely planned to leave behind through jealousy, overheard the plan and found out the details and told them," he replied.

"None were to be left," I exclaimed in surprise.

"Did you not plan to leave Kalu here?"

"We did not. He was the leader of the band who were to seize and protect the power installation by means of which we hoped to escape."

"Then Kalu lied," said Kapioma slowly. "This is not the first lie in which he has been detected. Courtney, it seems that even a Prince of Ulm may be a traitor. Bring in the slave, Kalu!"

The trembling Kalu was dragged by guards to the foot of the dais. He prostrated himself at the foot of the throne and looked abjectly upward. His subserviency disgusted me and I kicked him sharply.

"Get up and take your medicine like a man!" I said.

Kapioma smiled coldly as Kalu struggled to his feet with a black look at me.

"Kalu," he said, "you have lied once too often. The penalty for lying to the Sibama of Kau is death and that fate you have merited. The reward for treachery to your ruler in all countries is death and you have betrayed him who is your lawful Sibama, slave though he may be in Kau. Twice do you merit death and so slowly shall you die that it will seem to you that twice have you passed through the agonies of dissolution. You were planning to escape despite what you told me."

"I was not," cried Kalu. "I first learned of the plot last night through overhearing Moka and Courtney talk. I told my guards at the first opportunity."

"Bring in Moka and Hama," directed Kapioma.

THE two Alii were brought in and it pleased me to see that each of them bowed with just the right amount of deference due to a throned monarch and not a speck more.

"Was the slave, Lamu, included in the plot to escape and did he know of it before last night?" demanded the Sibama.

The two nobles glanced at me for orders.

"Speak the truth!" I said.

"He was included in the plot to escape and he was told of it four nights ago, Kapioma Sibama," said Hama. Moka nodded assent.

"By the voices of your countrymen are you condemned, Lamu," said Kapioma. "His death shall be a thing to bring the sweat of terror to the brows of condemned criminals for a generation. Courtney, the laws of Kau are not inexorable. You have been the victim of one you trusted and your suffering to learn that one of your Princes is a traitor is already a heavy punishment. It may be that you may not have to die. If you will divorce Awlo as I have requested, I will submit the question to my Council of Lords with a recommendation for clemency. No, do not answer me now; I know what your answer will be before you have had time to think the matter over. Reflect on this matter. If you die, with you will die every one of your followers who were concerned in the plot. As criminals shall they die by torture. For you, I decree a soldier's death."

"Not through any regard for me, Sapioma Sibama, but because you cannot elevate the widow of one who has died as a criminal to the rank of Sibimi," I replied hotly.

"Exactly, Courtney. Your refusal to accede to my terms will accomplish nothing. You may have two days in which to make your decision. In the meanwhile, it is my pleasure that any reasonable wish of yours be granted. Have you a desire?"

"Yes," I replied with my blood boiling, "let me be the one to execute your decree of death on that rat who has been the source of all my trouble."

Kapioma smiled slightly, while Kalu shuddered.

"Gladly," said the Sibama. "It will be an amusing spectacle. I will even let you choose the manner of his death."

"I wish to kill him in fair fight."

Kapioma studied the two of us for a moment.

"So be it," he said. "Should he kill you, the question of Awlo would be settled pleasantly. If he is the victor, his life will be spared and he shall serve as a slave in Kau for the rest of his days. If you kill him, both you and your subjects will be free. You will be taken to the Kau mountains and liberated with two weeks' supply of food and water and with arms. If any of you return to Kau, you will be put to death with torture. If you win through the mountains, the Mena will kill you? What say you?"

"And Awlo?" I asked.

He frowned.

"In any event, Awlo remains here and becomes my Sibimi," he said sharply.

"Then I will——" I paused in thought. I had been about to declare my preference for death in Kau rather than for a separation from Awlo, but a plan occurred to me. My death in Kau would rob Awlo of her only protector and the Kau mountains were where my precious firearms were stored.

"I accept your terms, Kapioma Sibama," I said.

"Bring fighting suits!" commanded the Sibama.

A guard hastened up with two fighting suits, each equipped with eight arms.

"A scientist such as you are, Courtney, needs no instruction to use such a simple appliance," said Kapioma in a cold voice. "Since Lamu has not your knowledge, I will personally instruct him so that the fight may be more even."

I saw at once that it was his plan that Lamu should kill me and I thought regretfully of the thirty-armed suit which Olua had told me was concealed in the laboratory. However, there was no use in crying for the moon and I devoted my attention to studying the six controls with which my suit was equipped. I soon had them located.

Kapioma put in some time instructing Lamu. When he was satisfied that my adversary understood his weapons, he gave orders for us to don the suits. We did so and the guards brought in a huge dome of some transparent crystalline material which they sat down over us. I have no idea what it was made of. It looked like glass, but since it was thirty feet in diameter and ten feet high and four men carried it with ease, it must have been made of some exceedingly light material. I could hear Kapioma's voice as plainly as though the dome were not over us.

"Let no one interfere," said the Sibama. "I will count to five. When I have given the final number you may fight, but not before. Are you ready? One! Two!"

A blinding green flash came from one of the arms of Lamu's suit. My left arm fell useless, paralyzed by the deadly ray. Lamu threw back his head and raised an arm to shield his eyes from the brilliance. The ray passed from me with no further damage. I waited for the further counting of Kapioma. I was sure that he had instructed Lamu to start the battle before the final count, but I was equally sure that I would be punished if I did the same.

"Three!" came his voice after a pause. "Four!"

LAMU had recovered from the shock and with a crafty expression he was slowly bringing his green ray, which had been blazing harmlessly against the crystalline dome covering us, to bear on me. Nearer and nearer it came and still Kapioma did not give the final word. The ray touched my paralyzed arm and traveled down toward my leg.

"Five!" came Kapioma's voice at last.

My orange ray blazed forth and Lamu's green ray disappeared. I wasted a moment by turning my orange ray against my paralyzed arm and restoring it to usefulness. With it again normal, I could use two of my weapons at once.

I turned the orange ray again on Lamu and then turned on in rapid succession my red and my green. This was a fighting trick which Olus had taught me. There was a blinding flash from Lamu's suit and his green ray disappeared. One of his most powerful weapons was out of commission.

A scared look came on his face and his red ray blazed out. I was resolved to act only on the defensive until his weapons were destroyed and I turned off my orange, green and red rays and let my blue one blaze forth. Vainly Lamu strove to pierce the shield of blue light with which I covered myself. He reached toward his suit again and a white ray began to play beside the red. Olua had told me of this terrible ray, which extracted the water from any substance on which it struck and I hurriedly turned on my yellow ray to combat it. Round

and round one another we circled, his rays trying vainly to find a hole in my armor of light. I strove to remember other tricks which Olus had told me of and one came to my mind. I suddenly turned off both my rays. Lamu swung the two blazing arms of his fighting suit toward my heart. I waited until the two rays overlapped one another and then turned on my green and yellow. With a flash his red ray ceased to function. With only one ray to guard against, it was a simple matter to keep him at bay.

I could remember no method of putting his white ray out of operation and to avoid prolonging the battle indefinitely, I turned on my green ray suddenly and directed it against his legs. Before he could switch on his orange ray to combat it, the paralyzing ray had got in its deadly effect and he fell in a heap. I hastened forward and stood over him. Olua had told me that almost any ray was deadly against the force which generated it. I seized the arm from which the white ray was blazing and slowly twisted it around. Lamu strove to fight, but a touch of my paralyzing ray made his arms as useless as were his legs. Slowly I twisted his arm until the white ray bore back against the arm from which it came. In another moment the ray ceased to glow and Lamu was shorn of his weapons.

A touch of either of my three offensive rays would have finished him, but I was not minded to kill him in that way. I bent over him and stripped his wrecked fighting suit from him. I tossed it to one side and stepped back. My orange ray glowed for an instant and Lamu rose as well and strong as he had been at the start of the battle.

"This fight is between you and me, Lamu Siba," I said slowly and menacingly. "Prepare to die at my hands."

Quickly I ripped my fighting suit from me. Lamu watched me like a cat. Once my arms were engaged in getting out of the suit he straightened up and rushed. I stepped back and to one side and gave him an opening. His right foot flew out and caught me a violent blow in the groin. With a cry of anguish I doubled up in pain and Lamu threw himself on me, a dagger gleaming in his hand.

I had sense enough left to twist to one side and Lamu's dagger merely scored my back. The pain of his foul blow was terrible and I was unarmed, but as he closed again I wriggled out of my suit and launched myself at his throat. His dagger flashed before my eyes but I disregarded it and closed with him. I grasped him by the throat and hurled myself to the ground, dragging him with me. I felt a burning pain in my shoulder and another in my side before my knee found his chest and I could wrench the dagger from his grasp and hurl it away. My hands closed again on his throat and I began to squeeze. His face grew purple and he looked at me appealingly. I released the pressure for a moment and put my head down.

"Mercy, Courtney Sibama," came in a coarse whisper from his lips.

"When did you show mercy?" I demanded. "Where is Awlo? Where is Kalu Sibama? Where is ravaged Ulm? Your life is trebly forfeit for your treachery and there is no mercy in my heart."

Slowly I tightened my grip on his throat. His breath came in gasps and then in a rattling wheeze. His head sank back, his eyes starting from their sockets and star-



ing horribly. I can see those eyes yet. Still kneeling on his chest, I released my grip on his throat and seized his head and twisted it slowly around. Further and further it went until the vertebrae gave with a snap and his head fell limp. So died Lamu Sibā, Prince of Ame of the Empire of Ulm at the hands of his ruler, whom he had betrayed.

I staggered to my feet and faced Kapioma.

"Your decree has been executed, oh Sibā," I cried between gasps. "When may I and my subjects depart?"

"As soon as you are recovered from your wounds and can travel, Courtney," he said gravely. "I am disappointed at the showing that dog made, but the word of the Sibā once pledged, may not be recalled. You are only changing the quick and honorable death of a soldier for a lingering death of thirst and starvation in the mountains. You have made your choice. Remember, however, that my offer of your life is still open. Divorce Awlo and I give it to you freely."

I straightened up to hurl a defiance into his teeth, but I could do no more. I had lost more blood than I realized and I swayed a moment and then everything went black. I seemed to be falling through an endless distance and then I could remember nothing more.

It was four days before I recovered consciousness, but when I did, I was ready to travel. The physicians of Kau had treated me with healing rays which had healed my wounds and restored my strength. I really felt little the worse for the terrible battle I had been through. Moka wished me to rest for a few more days, but I did not dare. The date of the death of the Sibimi of Kau was only fourteen days away and unless we could return to Kau before that time, I shuddered to think of the fate of Awlo. Accordingly, I sent word to Kapioma that I held him to his promise and desired to depart at once.

Somewhere in his heart there must have been a speck of chivalry which had not been bred out, for he came to the power house in person to see our departure.

"Farewell, Courtney Sibā," he said, "for once I have released you from slavery, your royal rank returns. I am sorry that you would not accede to the very lenient terms I offered you, for I believe you would be a useful member of my court. However, I have pledged my word and you may depart. I am merely changing the form of your death. You cannot return to Kau. If you stay in the mountains, you starve, and if you go to Ulm the Mena will kill you. In any event, you will be removed from my path in a few weeks."

I humbled myself to ask one favor before I left.

"Since I am going to death, Kapioma Sibā," I said, "I ask of your mercy one thing. I wish to see Awlo before I go."

His brow darkened.

"That is impossible," he said coldly. "Awlo does not know of your presence here and thinks you are dead. You soon will be and I have no wish to refresh her memory and reawaken her sorrows. It would turn her against me."

I did not trust myself to speak further but entered the waiting transport. My men followed me and in a few moments we rose rapidly into the air and headed away to the west.

"Where shall we land you, Courtney Sibā?" asked Neimeha, who was in command.

"Land us at the spot where you found me," I replied.

He shrugged his shoulders and spoke to the pilot. Two hours after leaving Kaulani, the transport dropped to a landing and we debarked. The ship hovered over us for a few minutes and then turned back toward the capital of Kau. Moka approached me as the Kauan ship disappeared.

"What are your plans, Courtney Sibā?" he asked.

"We will return to Kau and rescue our Sibimi. Thereafter we will do as circumstances direct."

"We are but a hundred and two," said Moka doubtfully, "and the army of Kau numbers thousands. Can we hope to win through to victory?"

"A hundred men properly armed can do wonders, Moka," I replied. "Have you forgotten the weapons which I went from Ulm to bring? They are hidden in these mountains. We will go to where they are and then make our plans. With them we will find an Alii of Ulm who has lived in Kau for years and knows their weapons. Do you think that the Kauan ship will return to watch our movements?"

"Since we are forbidden to return, I think it will."

"I hope so. If they do, I have an idea that may enable us to reach Kaulani without a fight. The first thing to do is to get proper arms."

My marching compass was one of the things which the Kauans had returned to me before they left us. My automatic pistols they had kept, although they were not familiar with their use. I laid off a course with the compass and, laden down with food and water, we started our journey toward the adjuster.

Moka had been right when he said that the Kauans would keep track of us. Late that afternoon, while our cavalcade was struggling wearily over the bare rocks, the transport which had brought us to the mountains sailed over us at a low elevation. The sight of our progress evidently satisfied them, for, after a careful survey of our column, they returned toward Kaulani. Night fell before we had covered more than half the distance which I calculated separated us from the adjuster, but I was confident that we were going in the right direction.

The night was bitterly cold and as we had nothing resembling blankets, all we could do was to huddle together and pass the night as best we could. The men of Ulm were unaccustomed to cold weather and they suffered horribly but none of them complained. The next morning we took up our march.

By noon I was confident that we had come far enough, yet none of the landscape was familiar. I halted the column and sent parties of scouts off in various directions. They were all ordered to reassemble at the central point before sundown.

It was a hard task to find one's way about the rugged country, even with a compass. I nearly got lost and the sun was setting when my party returned to camp. Two of the parties were still unaccounted for. We had no material with which to make fires and all we could do was to send up occasional shouts to guide the stragglers. One party came in about eight o'clock but morning dawned without trace of the other one. I was surprised at this, for I knew of the wonderful sense of direction and location which is the gift of all Ulmites. I made some tests and soon found that this sense was not operative in the mountains. Why, I can't explain. It just wasn't.



I held a consultation with Hama and Moka the next morning. I was sure that we were close to the adjuster and the ammunition and yet we had combed the country the day before and found nothing. I had a feeling that we were too far south and favored moving the camp, but the problem of the lost party remained to be solved. We finally decided to leave ten men under Hama at our first camp and move the rest some five miles north, keeping in touch by means of messengers. At the new camp I would send out fresh search parties. This programme we carried out, but another two days of combing the hills failed to locate the adjuster and I began to fear that the Kauans had found it and moved it. The fourth and fifth days passed in similar fashion and even my staunchest supporter, Moka, began to look dubious.

The morning of the sixth day we were about to start fresh parties out on their interminable search when a faint shout was heard from the south and we saw one of Hama's party approaching at top speed. As he came nearer, it was evident that he was laboring under great excitement.

"We have found the place, Sibama!" he gasped as he came within hearing. "Hiko's party found it the first day but the messenger they sent fell and broke a leg. It was not until today that he crawled into our camp, nearly dead from pain and thirst. He says that Hiko and two men stayed there, but he does not know where it is."

THE fact that the adjuster had been found near our camp was a heartening thing and we swiftly broke camp and retraced our steps to join Hama's party. We found that Hama had sent off all his men in the direction in which Hiko had left the camp and all we could do was to wait until they found the place. We had not waited more than three hours when a man arrived and told us that he had located it. He said that they had found the cave and the boxes in it, but that there were no signs of Olua or the adjuster. I started at once with a party with food and water for Hiko's men, leaving most of the men in camp until all of Hama's men returned. They were to move camp and join me the next morning.

The report of the scout was correct. In the cave were the arm chests and the boxes of ammunition, but there was no trace of either Olua or the adjuster. I racked my brains as to what could have happened. The only explanation which seemed logical was that when he had returned to the larger plane at my orders, his adjuster got moved. In such a case he might easily have come down miles away and was earnestly seeking us. The loss of the adjuster was a blow, but we still had our arms and ammunition and everything was not lost.

It was a short task to break open the rifle chests and the ammunition boxes and I felt better when I saw my tiny force armed with modern rifles and pistols, even though none of them had the slightest idea of their use and I had grave doubts of their value against the fighting suits of the Kauans. The fact that they did not know how to use the weapons did not worry me especially, for I knew that I had eight days before the Sibimi of Kau was doomed to die and I had a plan which, if successful, would enable us to travel over the two hundred miles which separated us from Kaulani in a short time. The Kauan transport had flown over us each afternoon, evidently checking our movements and my

plan was a no less daring one than attempting its capture. I blessed the fact that I had not completed my radiotelegraphic apparatus before I left the city.

My first task was to teach my men the use of the pistols and rifles. I had loaded a hundred rifles and thirty thousand rounds of ammunition on the adjuster together with a hundred pistols and ten thousand rounds of pistol ammunition. I felt that I could safely expend one hundred rounds of rifle ammunition per man and half that amount of pistol ammunition on target practise. We improvised a range and posted guards to warn us of the approach of Kauan ships. The Ulmites took to the guns as ducks take to water. In five days I felt my fire discipline was adequate and I anxiously awaited the arrival of the ship I had planned to capture.

To my horror, the ship did not appear on that day, nor the next day, nor yet on the next. Our food and water were about exhausted, for we had been allowed only a fourteen-day supply. Apparently the Kauans knew that we could not return to their country and had decided that we were afraid to face the Mena and thought it useless to keep further track of us. As the sun went down on the fourteenth day after we had left Kaulani, I was in black despair. That was the day set for the execution of the Sibimi of Kau and the thought of my princess at the mercy of Kapioma nearly drove me insane.

We could not possibly cover the two hundred miles separating us from Kaulani in less than five days of forced marching, even were we adequately supplied with food and water and unopposed. I had based all my plans on the capture of a Kauan ship. The morning of the fifteenth day found us with no water and almost no food and despair settled over the camp. We felt the urge to be moving but there was no place where we could go and nothing that we could do. We went through some rifle drill in the morning in a perfunctory manner and with the feeling that it was merely a waste of time.

In an endeavor to keep my men from brooding, I took them out on the improvised range again in the afternoon, but there was no enthusiasm. We were all suffering badly from thirst. I was about to order them back to camp when a shout from one of the lookouts whom we had posted as a routine matter, brought us to our feet. The lookout was shouting and pointing to the east. In the sudden silence which fell, I could feel rather than hear, the distant hum of propellers. Our plans had been made long ago and my men rapidly took the ambush formation I had laid out, while others, as the Kauans appeared, started a dropping fire at the distant targets.

I had counted on the curiosity of the Kauans to bring them to the ground to see what we were doing, nor was I disappointed. The ship hovered over our range for fifteen agonizing minutes before it swooped to a landing, a hundred yards from our firing point. A detachment of Kauans, wearing six-armed fighting suits, debarked and approached the firing line. I was hidden behind a rock perhaps fifty yards from the ship. The angle at which the ship landed was such that I could not see the control board through the open door, a vital necessity, if we were to capture the ship. I waited until the Kauans had passed me and blew my whistle.

A burst of fire came from the line and the Kauans staggered back under the impact of the heavy bullets at

short range. The fighting suits held and none of them were injured. Green and red rays shot out from the arms of the fighting suits. Half a dozen of my men dropped helpless and the Kauans advanced slowly in a line. This was the moment for which I had been waiting. Holding my fire at ready, I raced across the ground behind the fighters. The angle at which I ran brought the control panel into view through the open door. I dropped prone and cuddled my rifle to my cheek. I had been nervous, but when the moment came to fire, I was as steady as a rock. I picked out the switch which controlled the current which fed the fighting suits. The switch sat for a moment on top of my front sight as I slowly squeezed my trigger. With a crash the rifle went off. In an instant the rays died out in midair, and with a cheer my men leaped to their feet. A volley rang out and the ground was sprinkled with dead and dying Kauans. I had effectually disabled every fighting suit in the ship.

The pilot of the ship was not napping. My men raced toward the ship, but when the nearest was still fifty yards away, the central propeller began to whirl and the ship moved forward. Hiko was the nearest and he almost reached it when a blinding white flash came from its side and he dropped in his tracks. The ship moved forward with rapidly gathering momentum.

My men raced after it, but I knew the use of a rifle better than they did. I rammed a fresh shell into my piece and took careful aim. As my shot rang out, the central propeller slowed down for a moment and I hastily reloaded my gun. My second shot went wild, but the third scored a bull's-eye and the propeller slowed visibly and ran out of true. A fourth shot, the last in my magazine, stopped it entirely and the ship, with only the two wing propellers turning, sank toward the ground.

"After it!" I shouted, and my men toiled valiantly toward the dropping ship. I did not dare to risk a shot at a wing propeller lest the ship crash so badly that we would be unable to repair it. The ship touched the ground and came to a standstill. My men rushed forward with a shout of triumph. They had almost reached it when another blinding crash came from the side and two of the Ulmites crumpled in their tracks.

It was apparent that the Kauans possessed other means of offense than their fighting suits, but they seemed to be effective only at short range. I called my men back and a volley from our rifles riddled the transport. A second and third volley were poured into the cabin for safety's sake before we cautiously approached. No flash greeted us and we opened the doors to find the interior of the cabin a shambles.

THE soldiers removed the dead bodies while I inspected the ship. Aside from my first shot, not a one had struck the control panel, but the central propeller was wrecked. A cursory inspection showed me that the switch which controlled the fighting suits was hopelessly wrecked, but as my men did not know how to use those terrible weapons, it was a matter of small moment. I knew that every Kauan ship carried a set of spare propellers and I soon located them and set some of my men at work removing the damaged one. The Ulmites were about as clumsy with tools as it is possible to imagine and in the end I had to do most of the work myself. The result was that the sun had nearly set before I tested the new propeller with the control

panel and found that it had been properly installed. Our party embarked and I took my place at the controls. A hundred-man transport was not built for one man to fly and I had my troubles. How I cursed the luck which had made Olua miss the place when he returned to Kau in the adjuster. I would have given a great deal to have had him at my side. However, what must be done can be done and I got the ship into the air and headed for Kaulani.

For half an hour we made our way east without incident. A shout from the forward lookout apprised us of danger and Moka hastened to his side. He glanced through the telescope and informed me that three Kauan warships were approaching at high speed. I dared not leave the controls for an instant, so I hastily gave him directions for the fight which I felt was approaching and I drove forward.

The leading Kauan ship approached to within fifty yards and a string of illuminated signals broke out above her wings. I had no idea what they meant. The ship passed by, swung around in a circle and flew parallel to us about a hundred yards away with the strange signals flying. I gave the word to Moka.

A burst of rifle fire came from our ports and I had the satisfaction of seeing the Kauan ship reel wildly for a moment and then plunge headlong toward the ground. The other ships had not been fired on and they approached rapidly, one on either side. As the first one swept past us there was a blinding flash of purple light from her side. I was conscious of a feeling as though I had been struck a heavy blow, but they had miscalculated the range. While our ship reeled in the air, she righted herself and went on. The fire of our riflemen was deadly and the second ship plunged to the ground after the first.

The third ship had learned caution. It swung past us at a much greater range. When it was opposite us, a tiny spot of intense light shone for an instant and every switch on our power panel flew open. Our ship reeled and started to fall, but I dropped the flying controls and rushed to the panel. With both hands I closed the switches and then grasped the controls again and tried to right the ship. I had barely succeeded when the spot of light shone again and I had to repeat the task.

"Fire at them, Moka!" I cried. "Never mind the range!"

At my words, the burst of fire came from our ship but again the light glowed, this time before I had the ship under control. We turned nose down and fell rapidly. Apparently satisfied that they had put us out of commission, the Kauan ship turned her tail to us and sped away in the gathering darkness. I closed the switches and with all three propellers whirling at top speed, I strove desperately to right the ship. Nearer and nearer we came to the ground, but I wrenched at the controls with all my strength. Just before we struck I felt the craft respond to my efforts and slowly start to gain altitude. A dropping fire had been kept up at the flying Kauan and just as we started to climb, a shout of joy from Moka, who was at the telescope, told us that it was in trouble. At our best speed we drove it and soon it was again visible, flying slowly and in evident distress. A few well-directed shots ended the fight. We left it in ruins and resumed our course for Kaulani. Again I thanked my lucky stars that Kau did not have wireless communication.

Darkness came on rapidly, but I held my course by compass and in less than an hour the lights of Kaulani loomed before us. With all my lights blazing I headed boldly for the power house and landed on the roof. A detachment of the guard came to meet us and we opened the door and emerged. Ten of my men had donned the useless fighting suits of the dead Kauans and they led the way with me in their midst and the rest of the Ulmites trooped along after as though they were prisoners.

"What means this, Homena?" demanded the officer who had approached us.

These were the last words he spoke, for Moka had him by the throat before he could utter another. Before the menace of the lifted arms of the fighting suits, the unarmed Kauan guards surrendered and were taken into the flyer and bound and gagged. The ten men equipped with fighting suits, with me again an apparent prisoner in their midst, trooped down the stairs to the laboratory. We paused outside and I heard the buzz of a wireless transmitter. Waimua was apparently at work.

I motioned my men aside and softly opened the door. Waimua was alone in the laboratory and he looked up with a smile when I entered.

"Ah, Courtney," he said, "you are just in time. I have been hearing some signals on my receiver—"

He broke off as I covered him with my pistol.

"I want to save your life, Waimua," I said, "for you were kind to me, but to do so you must surrender to me. I am in control of the power house and my men are outside. If you make a sound, I will kill you where you stand."

"What do you mean?" he asked in amazement.

"Exactly what I say. We have returned from the Kau mountains to rescue our Sibimi and we will brook no interference. Raise your hands in token of surrender or I'll shoot."

Slowly he raised his hands as I had ordered. I turned to call my men, and he sprang. Not at me, but toward a button which was on his laboratory table. I liked Waimua, but it was his life or mine and with mine, Awlo's. My pistol spat out a message of death and the luckless scientist fell in a heap. At the sound of my weapon, my men burst in. We barred the door and waited breathlessly. Not a sound came from outside. Apparently the Kauans were enough accustomed to strange sounds from the laboratory to remain unalarmed at my shot.

**S**ATISFIED that we would not be interrupted, I took an ordinary six-armed fighting suit from the wall and donned it. I measured a distance of fourteen inches from the top of the huge testing screen, which covered one entire end of the laboratory and eleven inches from the left edge. I marked the place and stepped back. I pointed my red ray at the intersection of the two lines I had drawn and left it on full force for eight seconds. I shut it off and supplied the orange ray for twelve seconds. As I shut the orange ray off, a section of the screen opened slowly forward and there, in a recess cut behind the screen, lay the fighting suit of which Olua had told me. I drew it out and examined it.

The suit weighed less than twenty pounds, despite its thirty arms. I took off the six-armed suit which I was wearing and donned the new garment. It fit me like a glove and was not much more uncomfortable than an ordinary suit of clothes.

Olua had explained the suit to me and I found detailed instructions with it. I stepped back and spent several minutes in practising the use of the various controls against the protective screen. I did not have time to try all of them and no time to learn which control actuated which weapons, but I did locate the master control, which threw on all of the protective rays at once. Satisfied that I had learned enough, I led the way out of the laboratory.

For some unknown reason, we passed through the building and into the grounds without a challenge, although the sight of a detachment of eleven men in fighting suits in the Sibama's palace ground was enough to attract attention. We stole quietly toward the royal palace until we were under the south wing, where we knew Awlo to be confined. Moka pointed out her window to me and I gave my rifle to him and grasped a creeper which clothed the wall. It was a hard climb and I was tempted several times to return to the ground and take off the cumbersome fighting suit which I wore, but better judgment prevailed and I struggled on. At last I climbed to a point where I could look into her room. It was apparently empty and I inserted the point of my dagger and pried the window open and stepped into the room.

I found myself in a luxuriously furnished apartment, but a hasty search through the rooms proved them to be as empty as the grave. My heart fell, for I feared that Awlo had already been dragged to Kapioma's chambers. I tried the doors leading from the rooms and one of them opened at my touch. I found myself in a deserted corridor and I stole softly along it. I had almost reached an intersecting way when a slight noise behind me made me swing around. A hidden panel in the wall I had just passed was slowly opening and I stepped beside it. A Kauan Alii made his appearance and turned toward me. As he saw me, he opened his mouth to shout, but my green ray blazed forth for an instant and he stopped petrified. He had done me no harm and with my orange ray I removed the paralysis from his brain. His tongue I left helpless and before I left him I treated both his legs with a dose from my paralyzing ray. I left him helpless and went on.

I found myself in a secret passage, dimly lighted, and I stole along it for a few yards and found it ended in a stairway. I debated for a moment as to what course to pursue and then stole back to the panel. It was closed and I could not find the spring or lever which operated it. It would have been an easy matter to have burnt my way through with my heat ray, but I did not care to start a possible fire in the palace. I thought of restoring to speech the Alii who lay helpless before me, but knowing the Kauans as I did, I felt certain that his first action would be to give the alarm. Despite their cruelty and treachery, they were intensely loyal to their Sibana.

There was only one alternative. With a prayer in my heart, I returned to the stairway and proceeded down it. I went down a long flight and paused on a landing place where I could hear a murmur of voices. I touched the wall before me and found that it was no wall but a hanging. Cautiously I cut a slit with my dagger and peered through.

I was looking into the throne room from a point behind and slightly to one side of the two central thrones. The room was empty save for a small group which stood before the throne. I didn't stop to count

them, for my eyes were focused on one of them and my heart gave a bound which threatened to burst my ribs. The central figure was my adored princess, Awlo of Ulm. I could hear a voice speaking from the throne which was concealed from my gaze and I recognized it as Kapioma's.

"The Sibimi's throne of Kau is empty," he said in a voice which sounded as though he were repeating an argument for the hundredth time, "and I offer you the honor of filling it. I could take you without this formality, but such is not my wish. Your blood is royal and your children would be worthy of the throne of Kau, which they would occupy some day. Will you bid me lay aside the panoply of war and don the robes of peace that I may wed you honorably?"

Awlo threw back her proud head.

"Never!" she cried. "My lord, Courtney Sibama, lives and will rescue me. I could not be your Sibimi if I wished and would not if I could."

"I tell you that Courtney is dead," protested Kapioma.

"Not until I see his corpse will I believe that and when I do, my life will end as well," she said haughtily. "Beware what you do, Kapioma Sibama, the arm of my lord is long and he knows how to avenge any indignity to which I am subjected."

"Enough of this!" cried Kapioma angrily. "I am offering you no indignity but honorable marriage and the rank of Sibimi of the greatest empire in the world. If you will not wed me willingly, you will by force. Wedlock is essential that your children may be lawfully called to the throne of Kau. Where is the Mayor of the Palace?"

A gorgeously dressed functionary stepped forward.

"You shall wed us, Wiki," said Kapioma, "and as I have won her by conquest, I will be wed in the panoply of war."

He stepped down from the dais into the range of my vision. Had it not been for his voice, I would not have known him, for he wore a fighting suit from which fully forty arms protruded. The weight must have been great for he moved slowly and as if with an effort. As he approached, the Mayor of the Palace stepped forward toward Awlo, but recoiled as though she had been a deadly snake. In her hand gleamed a jeweled dagger.

"One step nearer and I will sheath this weapon in my heart!" she cried.

The Mayor stopped but Awlo could not fight alone the weapons of Kau. A green flash came momentarily from Kapioma's suit and the dagger dropped from her paralyzed arm. She turned to run but another flash, this time of a paler green, filled the room for an instant and she stopped in her tracks. Kapioma's guttural laugh rang out as he advanced to where she stood motionless. He took her hand in his and kissed it and then placed it for a moment on top of his head. He held out his hand and the Mayor of the Palace took it respectfully and raised it toward Awlo's lips. A sharp report rang out and the Mayor staggered and fell headlong. Unfamiliar as I was with Olua's fighting suit, I preferred to use the weapon I knew. I have mentioned before that I am a good shot, especially at short range.

A sweep of my dagger opened a way for me through the tapestry and I stepped out into view. The time for ordinary weapons had passed and I dropped both pistol and dagger and placed my hands on the control buttons of my fighting suit. I swung the deadly offensive arms

toward Kapioma and prepared to launch my deadly assortment of rays at him. The guards, armed with spears, were approaching from all sides.

"One step nearer and your Sibama dies!" I shouted.

THE Sibama stared at me for a moment and a look of wonder came into his eyes.

"Courtney Sibama!" he cried.

I bowed my head in acknowledgement but I did not take my eyes off him. It was well that I did not. Slowly his hands sought the control buttons of his massive fighting suit.

"Stop that!" I warned sharply. "If you try to use a weapon you are a dead man."

He dropped his hand and stared fixedly at me. The situation was a stalemate. Kapioma did not dare to move and I could not pick the helpless Awlo up and leave with her. I thought of trying a blast of one of my rays at Kapioma but I was not sure just which ones his fighting suit would stop instantly. Besides, if I opened hostilities, Awlo might be killed in the blasts of rays which would fill the throne room. For a full minute we stared at one another and then Kapioma spoke.

"Courtney Sibama," he said slowly, "one of us will never leave this room alive. You are wearing a fighting suit of a type I do not recognize. I wear the most powerful suit in Kau. Which of the two will win in a conflict, neither of us knows. If we fight in the open, no one can prophesy what the result to all in this room will be."

He paused and I nodded assent to his word but did not relax my vigilance.

"We both desire the same thing—the life and person of Awlo of Ulm," he went on, "and one of us will win it. Let her be won in fair fight and to the victor she shall belong."

"What do you mean?" I asked.

"Let a fighting dome be brought and placed over us. When the signal is given, we will prove which of our fighting suits is the most powerful. To the survivor shall belong the princess."

"If I win, have I the promise that Awlo and I can leave Kau with our subjects without hindrance?" I demanded.

"You may, without hindrance from me. Further than that I cannot promise. The word of a dead Sibama does not bind his successor. However, if you win, you should be able to fight your way out of the kingdom with fighting suits."

I hesitated for a minute. If I fought him and lost, my princess was doomed. If I won, all I could hope for was the chance to battle my way out with her in my arms. If, on the other hand, I refused his terms, she might easily be sacrificed during the battle in the open, which would ensue. I quickly made up my mind.

"Bring your fighting dome," I cried.

Guards hastened out to get it. Still keeping my hands on the control buttons of my suit, I walked down the steps of the dais and took my place facing Kapioma. The dome was brought in and placed over us.

"Take your hands from your controls, Courtney Sibama," said Kapioma, "in order that we may start equally."

I dropped my hands to my side. The Sibama turned to the ring of spectators.



"Noma," he said to an Alii who stood there, "take a spear from a guard and drop it. When that spear strikes the ground, the battle will commence."

The Alii took a spear and poised it. He stood in such a position that each of us could see him equally well. He poised the spear above his head for an instant and then let it fall.

The fractions of a second that passed before that spear reached the floor seemed like days and weeks. It seemed to move with infinitesimal slowness. I stole a glance around and the scene burned itself on my brain. Kapioma stood a few feet from me with a confident smile on his yellow face, his slant black eyes gleaming fiercely. All about us stood the Alii and guards of Kau, their yellow faces alight with excitement. Like a white flower stood out the form of my beloved princess, rigid in the grasp of the rays which Kapioma had poured out on her. I looked back and saw that the spear had almost reached the floor. Another glance at Kapioma showed that he had not moved but stood with muscles tense, waiting for the signal. At least, he was a fair fighter.

The spear struck the floor and my hands flew to the control buttons of my suit. I tugged the master button of the defensive weapons in the nick of time for the red and green rays flashed out from half a dozen of the arms of Kapioma's suits. They were absorbed harmlessly in the refulgence with which I was bathed. He stepped back a moment and shifted his hands. His first attack with his simpler weapons had failed and he was prepared to use weapons which were individual to his suit.

I remembered what Olua had told me and shut off my general protective ray. I hastily tugged at my fifth, sixteenth and seventeenth buttons. A dazzling kaleidoscope of colors surrounded me and I heard a report from Kapioma's suit. His simple paralyzing and heat rays had been rendered useless.

His hand found the buttons he wished and a fresh menace threatened me. From him came a cloud of purple gas which rolled rapidly toward me. I knew the weapon to use against that and I tugged at my eleventh button. The cloud of gas was drawn rapidly into one of the arms of my suit. I pressed my twelfth button and a cloud of yellow vapor rolled toward him. As his hands sought his defensive weapons, I tugged my ninth button and the gas dissolved into a blinding flash which rushed toward him. It struck him full on the chest and drove him back with the violence of the shock. I followed up my advantage with my violet ray, but he had recovered from the momentary effects of the surprise he had received and shot out a furry spiral of red flame, which twisted in and out before him and rendered the purple ray helpless.

From another arm came alternate flashes of red and white. I pulled on a defensive weapon but it had no effect. Through my protective screens the deadly ray was eating its way. I felt as though my veins were filled with liquid fire. Frantically I tugged at button after button. Cloud of deadly gases and vivid rays of various sorts leaped from the arms of my suit but Kapioma met each attack with a weapon of his own and rendered my efforts futile. And still that deadly red and white ate into my screen. It was a matter of seconds only before the end would come.

In desperation I used my final weapon. Olua had cautioned me not to use it, except as a last resort. With

a sob I tugged at my thirtieth button. As I did so, a blinding flash came from one of the arms of my suit. It struck Kapioma and coiled itself around him. Fighting against the strange power at every step, he was dragged relentlessly toward me. The red and white still glowed and my body seemed parched and dried up but I could not think of that. In another moment he would be within reach.

Despite his struggles, he was drawn closer until I could reach him with my hands. I understood why Olua had warned me against this weapon for my strength was rapidly oozing away. It took a tremendous toll of the user. Kapioma reached for other buttons but he was unable to use them. This thirtieth weapon of Olua's was nothing less than an electrical harnessing of the will of the user and while Kapioma was in its grasp, his will was a slave to mine. As I realized the nature of the strange force I was wielding, I concentrated on what I wished him to do. Slowly and reluctantly his hand sought his controls. He tugged at one and the deadly red and white which was eating into my very brain died out. I was temporarily safe.

I threw all the force of my will into the struggle and the force I exerted was magnified a thousand times by the instrument which Olua's genius had evolved. Kapioma tugged button after button, until not a ray gleamed from his suit and not a single deadly gas even oozed from it. With almost my last effort I pulled my second button and bathed him for an instant in the common green paralyzing ray carried by even the simplest fighting suits. He wavered a moment and then dropped in a heap. I shut off the terrible weapon with which I had conquered and swayed in weakness for a moment.

I thought I was going to fall, but I didn't. My eyes caught a glimpse of Awlo and it acted like a dash of cold water in my face. I braced myself up and faced the spectators.

"**R**EMOVE the fighting dome!" I cried, "and make way for Courtney, Sibama of Ulm!"

The dome was hastily lifted from me. As I approached Awlo, there was a disturbance at the door. I looked up and a more welcome sight never met my eyes. In the doorway stood Moka with a half dozen Ulmites with rifles in their hands ranged behind him. Four figures in six-armed fighting suits stood beside him.

"Way!" I cried imperiously, "Way for the men of Ulm! Way ere I blast a path through your living bodies!"

There was a general scurry at my words and the space between Moka and me opened. Down the path came my loyal Ulmites. At my orders two of them handed their rifles to comrades and tenderly picked up the form of my beloved princess. Down through the ranks of the scowling Kauans we passed until the door of the palace opened before us. Guards stepped forward to bar our way, long black tubes in their hands. I hesitated only a moment. The poor fellows wore no fighting suits and it was almost murder but I did not dare to hesitate. I tugged my fourteenth button and a flash of violet flame leaped in front of me. The guards went down like tenpins, their black tubes exploding with brilliant flashes of light. As we emerged from the doorway, a distant crackle of rifle fire told us that Hama's party had left the roof and were fighting their way down through the



power house. In a compact group we raced across the lawn toward the building.

We had covered about half the distance before we were opposed. I heard a shout behind us and turned and looked. Emerging from the trees at one side were a group of figures in fighting suits. We were a little closer to the power house than they were, but we were handicapped by our rifles and we had to carry Awlo. It looked as though we would arrive at the door at about the same moment. My decision was made in an instant. Warning Moka to hold straight for the door, I turned at an angle and raced to meet them.

As I approached the newcomers stopped and rays began to flash from the arms of their fighting suits. None of the suits carried more than ten arms, so I pulled on my general protective rays and charged them. They strove to run but they were too late. Again my fourteenth button came into play and they toppled in heaps. I glanced over my shoulder and saw that Moka's party had gained the doorway.

I bounded through the door and Hama slammed it shut behind me. I was positive that there were protective rays of some sort that could be brought into action but I did not dare to look for them. Hama told me that the power house was clear of Kauans except for one room in which a few were barricaded. I knew that they would soon emerge wearing fighting suits and that more men from the palace would be using more potent weapons against us in a few minutes. With Hama and Moka at my back, I ran for the central control room. I reached it just in time.

My hand was on the switch controlling the fighting suit power when a door opened and a dozen figures wearing many-armed suits entered. I let them approach a few feet and pulled the switch just as their hands were seeking the control buttons. When I pulled that switch every fighting suit and every weapon of war in the empire of Kau became useless. It took me only a few seconds to pull the other four controlling switches and everything which depended on power in the empire was useless. The science of our enemies was at an end and the battle, if battle there was, would be fought out hand to hand in the same manner as the old battles with the Mena. The only power left in the land was a tiny auxiliary generator which fed the lights in the power house itself. As we saw in the morning, my action in pulling the switches came none too soon. Two huge Kauan warships had crashed in ruins not a hundred yards from the building. Had I been a little slower, they would have landed on the roof and we would have been caught between two fires.

I left Awlo in the laboratory and hastened out to look after our defense. Although crippled by the loss of power, the Kauans were not altogether helpless. They were present in tremendous numbers and they still had a quantity of the black tubes which I had noticed in the hands of the guards at the palace gates. These tubes were not dependent on power for their discharge, although once fired, they could not be reloaded while the generators were shut down. They carried a large charge of static electricity and at short range they were very deadly.

Armed with the tubes and with spears, the Kauans made a determined assault on our fortress. The attack was doomed to failure from the first. The flash tubes were not dangerous at ranges of over fifty yards and we

mowed down the attackers with our deadly rifle fire. The attack waned after a few minutes and I returned to the laboratory.

Awlo lay on a table, cold and rigid. There was a complete absence of respiration and I could not detect the slightest flicker of a pulse. I would have unhesitatingly pronounced her dead, had I not seen what had happened to her. I knew that Kapioma would never have fought for the possession of a dead body and I was confident that there was some method of reviving her, could I only find it. I ordered Moka to turn on the switch which controlled the fighting suit I had worn. He did so and I bathed her in a refulgence of the orange anti-paralysis ray. It had not the slightest effect. For an hour I experimented with various rays and combinations of them without result. I did not dare to use most of the weapons in Olua's fighting suit for I was not aware of all of their properties and I might easily do more harm than good.

As I studied her prostrate figure, I was alarmed by a crash at the main door of the house. I started down to investigate, but a messenger from Hama met me before I got there.

"A Kauan!" the man gasped, "a Kauan in a fighting suit has broken in the door and has killed a dozen of our men!"

The explanation rushed to my mind. When I had connected up the generator which had actuated my fighting suit, I had also supplied power to Kapioma's, which worked on the same wave-length. I hurried to the control room and pulled off the switch. A crackle of rifle fire from below told me that my men were engaged. I rushed down the steps to take charge, but I was no longer needed. When the fighting suit was rendered helpless, our rifles came into their own and they made short work of the Kauans, who had followed their leader in through the wrecked door.

In an hour the door was repaired and we were again in a position to bid defiance to the armies of Kau, but I learned with regret that the fleeing Kauans had carried off the body of their leader and so, of course, his fighting suit. If we had it, two of us could have walked unopposed throughout Kaulani. As it was, I did not dare to again turn on any of the generators which would arm our enemies. Since I had no idea of what to do for Awlo, even had I had plenty of power, it did not seem to matter much.

In point of fact, our situation had many elements devoid of cheer in it. To be sure we were comparatively safe in the power house, but we had no way of getting out. We had a hundred-man flyer at our service, but if we turned on power to run it, we mobilized every warship in Kau. We had plenty of powerful fighting suits, but there were more powerful ones in the hands of some of the Alii of Kau and arming our suits meant arming theirs. As far as I could figure out, in capturing the power house, I had put myself in the classic position of the man who had caught the bear by the tail; I needed a lot of help to hang on and a darned sight more help to let go.

I WENT back to the laboratory and studied the rigid figure of Awlo, but no new suggestion came to me and I lay down for a few minutes of rest, hoping that time would solve the problem. In any event, I felt sure that we could hold the power house indefinitely.

In thinking this, however, I had underestimated the power and resourcefulness of the Alii of Kau, as the morning showed.

All night we heard the sounds of men working and saw faint lights flickering back and forth across the lawn. We tried them with a shot occasionally but we had no ammunition to waste and I ordered the men to hold their fire. When day broke, we saw on the lawn between the palace and the powerhouse, an enormous machine made of metal. As we watched, it moved slowly forward toward the power house. I had forgotten that the Alii and even the soldiers and commoners of Kau were familiar with electricity in all of its forms. The obvious thing had occurred to them. Since their regular source of power had been shut off, they had collected or constructed batteries and were driving this tank, for that is what it looked like, toward us with direct current. From the moving mass of metal, heavy cables trailed back toward the palace.

I took a rifle and fired at that cable, directing my best shots to do the same. Despite the fire we poured in, the machine continued to advance until it was only a few yards from the building. From its side a bolt of what looked like lightning came and the power house door was again splintered and driven from its hinges. The machine moved forward for a few feet and stopped. No fresh bolts came from it and it was apparently helpless. At last a lucky shot had severed their connection with the source of power we were temporarily saved.

As no fresh attack seemed imminent, I left Moka in charge of the defense and returned to the laboratory. It had occurred to me that direct current might have some effect on Awlo.

As I entered the laboratory, a familiar sound struck my ear. I paused and looked around but I could not locate the source. It was an intermittent buzzing and crackling and as I listened, it began to form itself into letters and words in my mind. "-----"

"-----," I heard and then "-----"

"-----" "COURTNEY, COURTNEY SIBAMA." There was only one person in the world who would be calling me by wireless and calling me by that title. I jumped for the radio set which had stood unheeded on the laboratory table since Waimua's death. As I clamped the headphones on my ear, the message came through plainly and distinctly. It was a matter of seconds only until I had the transmitter hooked up and ready to send. Luckily, both sender and receiver drew their power from the auxiliary generator which normally supplied only the lights in the power house. I pounded my key rapidly.

"Olua," I called. "Olua, can you hear me?"

"Yes, Courtney Sibama," came the reply.

"Where are you?" I tapped out.

"At the cave, where we parted. The arms are gone. Did you return for them or did the Kauans get them?"

"I have the arms here."

"Where is here?"

"At the power house in Kaulani. I'll tell you the situation."

"All right, but send a little slower."

As briefly as possible I told him the events which had happened and the situation in which we were. I told him of the deadlock and that we were afraid to turn on any power. Last I told him of the attack launched by battery driven appliances that morning.

"How long can you hold out?" he asked.

As the message came in, a crash from below, followed by a burst of rifle fire, told me that a fresh attack had been launched. I told Alua of this fact.

"Battery apparatus won't do much harm," he answered. "If you can hold out for a few hours, I'll be with you and help you."

"How can you get here?" I asked, "there is no power being broadcast."

"I'll get there," he replied. "Look for me in three hours or less."

"Wait," I demanded. "I want one bit of information."

In a few words I described the condition of Awlo.

"Was it a light green ray with yellow flecks?" he asked.

"Yes."

"Use button twenty-eight on my suit for two seconds. Goodbye. I'll be with you soon."

Without regard to the risk I was running, I dashed to the control room and threw on the switch which actuated Olua's fighting suit. Back in the laboratory, I donned the garment and with trembling hands pulled button twenty-eight. Nothing happened for two seconds and then Awlo sat up. With a shout of joy I released the button and started for her. She gave a cry of terror and strove to run. I stopped aghast at her reception of me, until I remembered the fighting suit which I wore. She took me for a Kauan.

"Awlo!" I cried as I threw back my helmet. "It is Courtney, your Courtney! Don't you know me?"

She looked at me in wonder and then with a sob of utter thankfulness threw herself into my arms. As I clasped her, there came an interruption. Moka dashed into the room.

"Sibama!" he cried, "Come quickly or we are lost. The Kauans are winning their way in."

So excited was he that he failed to notice Awlo. As I released her, his jaw dropped and he fell on one knee.

"Sibimi!" he cried and the worship in his voice made me realize anew the depth of affection which these tiny men had for their rulers. I gave him no further time.

"Come, Moka," I cried, as I pulled my helmet back into place, "we must go to the rescue."

I led the way down the stairs to the doorway. A number of Kauans equipped with fighting suits from which long leads trailed back to the palace, had crossed the lawn and forced their way through the shattered door. Bullets had no effect on them and my men went down like tenpins before the deadly rays which poured from them. Their feeble fighting suits, however, were no match for the one I wore and in three minutes after I arrived, not a live Kauan remained in the powerhouse. My violet ray disposed of them. As the last one fell, a figure wearing Kapioma's forty-armed suit came from the palace and lumbered slowly across the lawn. Before he was close enough to do any damage I had the power shut off and he fell before a well aimed bullet from Hama's rifle. The danger was again temporarily averted and I turned my attention to my men. The improvised suits did not have enough power to kill, or else it was not a killing ray that was used, for they were merely stunned and a few minutes of care brought them to, as well as ever.

Leaving Moka in command, I hurried back to the laboratory. Awlo threw herself into my arms again as I

entered. I embraced her fervently and then turned to the key of my wireless. Not an answering signal could I get. I gave up at last and devoted my attention to Awlo. Her story was soon told.

The adjuter must have been moved slightly without our knowledge when Lamu had stolen it and fled with her, for they landed in Kau, not far from Kaulani. Lamu had attempted to force his attentions of her and had threatened her with death if she did not substantiate his story of my treachery. When I heard this, I gritted my teeth and wished that I had killed Lamu more slowly and painfully.

They attempted to make their way to Ulm but they were seen and taken prisoners. They were taken to Halekalo, one of the cities of Kau, several hundred miles from the capital. There they were held as prisoners for several months. Word of their presence was finally brought to Kaulani and Kapioma had ordered them sent to him. He had at once made Lamu a prisoner and confined him with the survivors of Ulm who had been meanwhile captured and brought to the city. Awlo he treated at first as an honored guest, but during the last few months he had tried unavailingly to win her consent to their union. The final scene of his attempt was the one which I had interrupted in the throne room.

She had consistently refused to give him any cause for hope, for she assured me that she never would believe that I was dead but always expected me to rescue her. Until I entered the throne room she had no idea that I had been in Kaulani.

**A**N hour later the Kauans attacked in earnest. Wearing their improvised direct current fighting suits they came in force and repaired the broken cable which led to their machine. I went down in my fighting suit to rout them, but I did not dare to turn the power on. One of them was wearing Kapioma's suit and any attempt to render mine active would have activated his. He kept behind a screen of men and was effectually protected from our rifles.

Slowly the huge tank-like machine moved forward. We poured a storm of rifle and pistol bullets into it but they had no effect. Like the heroes they were, the loyal Ulmites threw themselves before it and strove to stop it with their bodies, only to fall before the deadly rays which it poured out. Half of my men were down and the tank was slowly but inexorably approaching the open doorway. At intervals blinding flashes of white light came from it and whatever stood in their path, be it man, wood or stone, was shattered to fragments. On it came despite all our efforts. I was about to order the power turned on and make a last desperate attempt to stop it with Olua's fighting suit, despite the one I would have opposing me, when an unfamiliar sound stopped the fighting for a moment. There was a silence and I heard a sound I had never expected to hear again, the drone of an airplane motor. The Kauans looked up and gave vent to cries of surprise. Half of them raced back toward the hangars where their war machines were kept.

Louder and louder became the sound and over the palace grounds swooped the familiar form of a trimotored Fokker. I gave a shout of joy when I saw it and another one of exultation when I realized who the pilot must be. I suspected what Olua was up to and I called my men under shelter.

The Fokker swooped down low over the palace

grounds and then up. A second time it swooped, and as it passed, a few hundred feet above our heads, something was thrown from the cockpit. It was a long black object and it fell slowly toward the ground. Square on the Kauan machine it landed. There was a deafening crash and a burst of smoke. Fragments of the machine flew in all directions. The Kauans who remained on their feet fled with cries of alarm.

Again the Fokker swept up and back over the palace. Another black cylinder fell and a huge hole was torn in one corner of Kapioma's stately residence. Apparently satisfied with the damage he had done, the pilot swung down with idling motor. I raced to the roof to meet him. The Fokker came down and made a perfect landing, although it would have rolled off the roof had not several of my men been there to check it. Removing his flying goggles, Olua climbed out and knelt at my feet.

"You came just in time, Olua Alii," I said as I raised him to his feet. "I feared that your adjuter had been moved and that you could not find your way back."

"I had no trouble, Courtney Sibama," he replied. "I exceeded your orders somewhat but I felt certain that you would approve what I did. I got to the larger plane all right and learned to fly your ship with no trouble but it took me a long time to get the explosives you wanted. I could make myself understood only with difficulty and when they understood, they would not give me what I wanted, although I offered them the metal you told me to use. At last I found one who knew you in the place they call Beatty and he got them for me. Then I returned as quickly as I could."

"And just in time," I repeated, "and you are more than welcome. I was about at the end of my resources, but with your knowledge of Kauan fighting methods, the battle will be on a more even footing now."

Olua inquired as to the details of the fight and expressed himself as surprised at the stubborn resistance we had made. As a member of the Council of Lords, he requested a private interview with Moka and Hama, a favor which I promptly granted. In an hour the three of them entered the laboratory where I was talking to Awlo and requested permission to speak.

"Speak on," I said puzzled at their grave faces.

"It is the law of Ulm," said Moka gravely, "that when dire peril threatens the persons of the Sibama or the Sibimi, the word of the Council of Lords shall rule, if it will promise safety. Is that not so, my lord?"

"It is," I replied.

"Grave danger now threatens you and Awlo Sibimi, my lord. It is the word of the Council of Lords that you take the flying ship in which Olua Alii arrived and take the Sibimi to a place of safety."

"I'll do nothing of the sort," I said shortly.

"You must, Courtney Sibama," said Moka earnestly. "All of us have risked our lives and Oula Alii has returned from a place of safety to one of peril to assure the safety of our rulers. Unless you avail yourself of this chance, the sacrifice of those who have already died for you will be in vain. For countless generations my fathers have served the royal family of Ulm and it is just and fitting that the last member of my family should die that the royal family of Ulm should live on. Besides, the ammunition is running short."

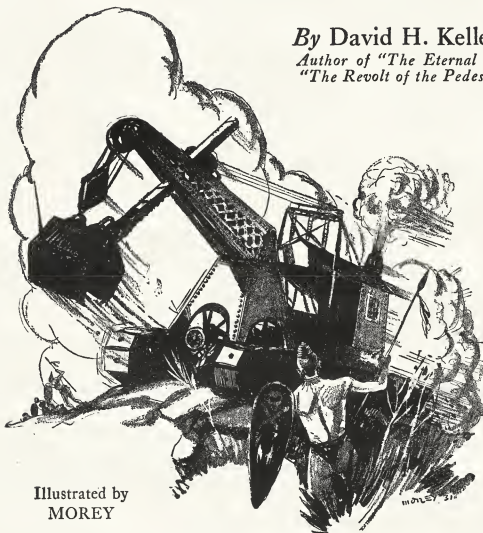
This last was serious news. I inquired and found that we had less than sixty rounds of rifle cartridges per man

(Continued on page 526)

# The Steam Shovel

By David H. Keller, M. D.

*Author of "The Eternal Professors,"  
"The Revolt of the Pedestrians," etc.*



Illustrated by  
MOREY

*HERE is a unique story dealing with ultra-modern brain surgery, for which purpose the famous Chinese surgeon, Wing Loo, of "Cerebral Library" fame, is called to the scene. This is a distinctively Keller story, which will bring us a great deal of interesting comment.*

*... and then, before any of us realized what had happened, the shovel turned to the left and started up the mountain-side on its caterpillar tread.*

AFTER his failure in working out the details of THE CEREBRAL LIBRARY, Wing Loo, the great Oriental surgeon, decided that it would be best for him to take a prolonged vacation. He decided on a trip to Burmah. There was a man there, an engineer, by the name of Francis Smith, who was doing some wonderful railroad building. Wing Loo felt that a few months in the company of Smith would be good medicine for his soul.

It was to be a real vacation, without any surgery of any description. At the last moment, however, the Oriental compromised with his resolution and added his case of instruments to his baggage.

He found his friend, Francis Smith, hot and bothered. It was one thing to build a railroad in a temperate climate with white labor, and decidedly another thing to build even a short road in Burmah, where heat and rains and disease and the most temperamental of Oriental labor constantly offered new and almost unheard of problems to be solved.

East met West the first night of the visit. Wing Loo, dressed in the simplest manner, wore jewelry that would serve to ransom a captive king. His slender hands,

tapering fingers, wore rings that his ancestors had worn for more than two thousand years. One hand rested on his lap, the other languidly waved a fan of peacock feathers. Smith, son of an East Side contractor, grandson of a nobody, dressed in the clothes he had worked in all day, alternately swore and pounded the table. The Oriental watched him wear his wrath away.

"It may be," at last the Chinaman found a chance to say, "that I can be of service to you. Being born in the East, I know the souls of the Orientals."

"It will take more than just knowing their souls," replied Smith. "Something has to be done to make them work. The job would be finished by now if they were white men. I have coaxed and threatened and bribed. I have raised their wages and increased their food—just about worried myself sick, and nothing does any good. My company has a contract with the Rajah, and I think that he is anxious to have the road finished, but, at the same time, he does not seem to be willing to help me with the labor end of the proposition. He tells me the common people are superstitious and feel that the Old Gods are offended by the idea of a railroad and that the Gods will send cholera and rains and famine."



"Have you tried the Priests? Given presents to their Gods?"

"Yes. They take my gifts and that is all the good it does. Looks to me as though they are simply double-crossing me, or they do not have the power they boast of."

Wing Loo shut his eyes. At last he smiled as he whispered,

"What you need is a miracle, a direct message, showing the Gods are on your side."

"Perhaps, but I am not a magician."

"But, do you need native labor? I thought you Westerners had wonderful machinery?"

"I have. I am going to show you the finest steam shovel you ever saw. But it needs a man to run it, and white men don't last in this climate. Between disease, heat, liquor and women, they die faster than I can bring them in, and not every tramp mechanic can operate that steam shovel."

"You have elephants?"

"I have. But the elephant has to have the native, and I feel that even the beasts are not doing their best, but only as much as their mahouts want them to."

"You may be mistaken. The elephant is very wise. Some think that his intelligence is greater than that of man."

"At times I think that is correct. I will show you a real elephant tomorrow. I do not know how old he is, but that elephant can think. He works with the steam shovel. I do not know just how I would get along without the pair of them, the shovel and the beast. But I am selfish to talk all the time about my trouble. It has been years since I saw you. Have you reached the success you were dreaming of?"

"I am a surgeon," admitted the Oriental, simply. "I feel that those who know me best will admit that much. Lately, in a trip to America, I was also very much of a fool. The memory of that trip for many days will keep my pride bent to the dust. But I have been able to do a little surgery, and hope in the years to come to do more, but not in America."

"Oh! well," exclaimed the American kindly, "We all get our bumps now and then. I always thought you would be a great surgeon. I used to like to watch you operate. You did such little things and did them so well. In a way, I operate, facial surgery on old Mother Earth with a steam shovel. But I knew you were going to win out, Wing Loo, and no matter what happened to you in America, I would just forget it. I bet anything it will never happen again."

"You are kind. Perhaps as your guest I shall find peace."

"Perhaps you will, but most of my days are far from peaceful. But you stay here as long as you wish. Perhaps you will be able to help me in my problem."

"That would give me great joy," whispered the surgeon. And he meant it. Years before he and Smith had come very close to each other, and a friendship had been formed that was very warm and binding.

The next morning the old friends climbed into an ancient Ford and started off to the head of the new railroad. Smith was still disturbed, even more so than on the previous night.

"One more engineer gone," he told Wing Loo. "This man was fool enough to monkey with a native woman and ended with a knife in his ribs. I should not care

very much, but he was the last man on my force who could operate that steam shovel. Now, it will have to be idle, or I will have to work it, and when I start in with detail work like that the whole construction suffers. My native straw bosses are not worth the powder to blow them to—"

He never finished the sentence. The Oriental interrupted.

"Would you allow your unworthy friend to do the work till you can find some one?"

"You? Why, you can't operate a steam shovel!"

"I believe I can. At least with a very little special help. One of my favorite hobbies is steam. I have many little models."

"But this is a caterpillar, and the shovel holds nearly two tons of dirt at a bite."

"The larger the machine, the more satisfaction it will give me to operate it. Last night you intimated that I could only do the little things, and that I operated with little instruments. I long to do facial surgery on Mother Earth with the steam shovel."

"All right. If that will make you happy, go ahead. There is the old shovel in front of you. I will have steam on in twenty minutes, and there is old Mabut Rae, looking his old friend over. Bet he is puzzled at its lack of life. Look at him, feeling it with his nose trying to decide what is the matter. There is a strange relation between those two mammoth workers. At times I have thought that the shovel was as much interested in the elephant as the elephant was in the shovel. Hey, you boy, start fire! Get me overalls. Quick. Hells bells, Wing Loo, these birds don't know how to move."

But in half an hour the Oriental was in the engineer's seat, learning the various peculiarities of this special shovel. And half an hour later the shovel was working methodically, taking enormous bites out of the cut and precisely emptying each mouthful into one of the dirt cars waiting on the emergency track. At noon the Oriental seemed to be not only in thorough control of the machine, but having a very enjoyable time. At the noon hour he sent for several of the straw bosses and held a whispered conversation with them, and after that there seemed to be a decided acceleration of the work.

Meantime the old elephant, Mabut Rae, was performing odd jobs in the vicinity of the shovel. Now and again he came over to the steam shovel and lovingly caressed parts of it with the end of his trunk. Once he blew some dust off a part of the engine. Wing Loo watched him as carefully as time would permit.

The elephant was a very old one. The mahout was fond of telling how his grandfather had first cared for the elephant over a hundred years ago. Three generations of men had lived their lives in close association with one beast, and the present mahout was no longer a young man. No wonder they treated the massive animal more like a god than as an inferior creation.

After the first day everything connected with the building of the railroad went faster. The men worked better. With the Oriental in charge, the steam shovel did wonders, and Smith marveled at the change. He admitted as much to Wing Loo who smiled as he replied,

"Before I came, my friend, you were in charge of the work. Now, we have a combination from the East, building an Eastern railroad. Even the steam shovel has, in a peculiar way, changed its temperament. The elephant is happy. The men work more willingly."



"You must have done something to them."

"I suggested sudden and painful death if they continued to annoy you with their dilatory tactics."

"I thought there was something like that. Still, I should worry. If we can keep this pace up for three months, the road will be finished, and my company will earn over a quarter million Mexican dollars bonus. The Rajah promised us that. If only something does not happen."

"What is to be will be, friend. We of the East are fatalists. We believe in the circle of existence, in predestination. When something happens, we will be prepared."

And something did happen. The Rajah himself, the great ruler over two million human beings, who in his eyes were but worms, came to see the building of the road. He admired it all, praised Smith lavishly, sat patiently for fifteen minutes watching the giant steam shovel at work, and then suddenly frowned,

"What is the name of that elephant?"

"The one near the shovel?" asked Smith.

"The same."

"Mabut Rae."

"I thought so. When I was young that elephant carried me on a tiger hunt and I lost my game because he stumbled. I ordered him killed, and now I see that my order was not carried out. You will have him killed or I will tear up your tracks and throw them and you into the sea."

Smith knew when he was up against it.

So he promised to have the elephant killed.

That night he was mad; so mad that he could hardly speak or keep from becoming beastly drunk. Wing Loo watched him closely.

"It is only an elephant, my friend," he expostulated.

"No! Not an ordinary elephant. That is a smart one and it will just about kill the old mahout."

The surgeon kept on smiling.

"What effect will it have on my shovel?"

"What do you mean?" asked Smith sharply.

"There seemed to be a rather definite rapport between the two. Perhaps the death of the one will affect the other?"

Smith started to drum on the table with his finger tips. He did not know it, but he was tapping out S.O.S.—S.O.S. in the telegrapher's code.

The Oriental reached over and calmed those nervous hands.

"Smith," he whispered. "Soon I must go, and then there will be nothing left but you and the shovel. Perhaps the workers will not want to obey. So, I have thought of a miracle. I will do something for you that will help you finish the road, with the shovel, whether I am here or not—and old Mabut Rae will help us."

"But we have to kill him!"

"His very death will serve as the basis for your victory. You go tonight down to the coast and buy me the things I will write for. Go and do not come back till you have them all. I will stay here and carry on the work. The elephant will live till you return."

"Will you work him?"

"No. I will keep him happy with opium, but I will work the mahout. I will teach him to stoke the furnace of the steam shovel. I will teach him to be a fireman, to take wood of the proper length and with it to keep steam. I will teach him to put in water and oil."

"What's the grand idea? Going to have him take your place as engineer?"

"No. I have someone else in mind for that job."

At daybreak Smith started down the river in a small steam launch. Four days later he returned and had the coolies carry many mysterious packages to his bungalow. He found that Wing Loo had built a large fence around the house and had cut down the trees, the tops of which commanded a view of the inside of the stockade. The steam shovel was there. Its caterpillar drive almost pressing against the veranda of the house. Mabut Rae was there, silently rocking backward and forward. The mahout was there, thin and covered with ashes. Several Chinamen moved noisily, but efficiently, arranging the last details.

"Give all your men three days' holiday with pay," commanded Wing Loo, and Smith, mentally resisting, did as he was told.

The packages were opened, the contents classified. Peculiar and most unusual changes were made in the mechanics of the steam shovel. An additional electric system was installed. On the driver's seat a large glass jar was fastened, the top, for the present, being left off. At last Wing was ready. The outdoor operating room was prepared.

"We are now ready," he told Smith, "to kill the elephant."

"Forgive us, Mighty God," prayed the mahout, "for doing this unpardonable crime, but there is no other way."

Drunk with opium, the elephant swayed and fell. Wing Loo and his assistants started to operate.

SMITH sent the tusks, ears and tail to the Rajah, with a letter to the effect that the imperial order had been obeyed. The stockade was taken down and the steam shovel rolled, on its caterpillar drive, back to the head of the construction work. Wing Loo sat on an auxiliary seat, back of the place usually occupied by the engineer. In that place was a large glass jar, only now the top was on and the entire pieces of glass painted a deadly shade of black. In back, stoking the furnace, was the mahout, a little thinner than ever, if possible, with a peculiar glistening gleam in his eye.

On its way from the house to the latest cut in the grading operations the steam shovel passed a thousand working men. If they saw anything odd about the machine, they at least made no sign. But they were not as noisy as usual. The chatter and sing-song were absent. Even the monkeys in the forest were quieter than usual. At last the caterpillar paused. The shovel sank, its jaws opened, and tons of forest dirt were caught and carefully carried around till it could be dumped into a dirt car.

The steam shovel was at work once more.

The Rajah was satisfied.

Wing Loo sat with folded hands, carefully watching the work of the shovel. Now and again he called the mahout to him and made a slight adjustment, explaining the reason for it. That night the mahout slept by the side of the shovel.

The next day the steam shovel worked without Wing Loo in the emergency seat. On the third day he had the coolies take that seat away. And from then on the steam shovel worked without an engineer, but the mahout made steam and furnished the engine with water and oil.

And, one at a time, or in little groups, the laborers

came and made their prayers before the steam shovel and after working hours came and timidly hung garlands of flowers on his massive sides, and food in plenty flowed into the wooden bowl of the mahout who slept and lived in the shadow of the great machine.

"And now I can safely leave you," said Wing Loo to the American. "For the necessary miracle has been performed, and all will work for you to the best of their ability, for the fear of the God is in their souls and they cannot do otherwise. When I came here, Smith, I was humiliated with the thing that happened to me in America, but now I am rejoicing at the thing that has happened to me in Burmah. Come and see me when the railroad is finished."

"I will do that, Wing Loo," replied the engineer, as he took his friend's hand. "And let me tell you this. You are not only a great surgeon. You are something more, and hanged if I know the right word to describe it!"

SIX months later the two friends were seated in the palace of Wing Loo. This time Smith was in formal evening clothes. The Chinaman was filled with curiosity, but he waited for the right time to come. Then he asked,

"You finished the road?"

"Yes, and it was a good one."

"Your company received the bonus?"

"Yes."

"And the steam shovel kept on working?"

"Yes."

"Save my unworthy life and tell me about it."

"It was wonderful. It never made an unnecessary move. Always on time. I never saw a shovel do better work, and that old mahout tended to it as though it were a baby. You had him well trained, but of course the secret of his constant care was the fact that he loved the shovel. They understood each other."

"The natives never did understand it all, but they knew there was some connection between the old elephant and the shovel. They probably thought that the elephant's spirit had entered into the machine. At least they worshipped the shovel as if it were a god, and I had no further trouble with them."

"Of course, the mahout knew what had happened. He saw you take the brain out of the elephant. There was a lot about it he could not understand, but he knew that so long as he followed your instructions the god he and his family worshipped for over a hundred years, would live on, perhaps not in the same shape, but at least with the same intelligence. It was pathetic to see the way he cared for that steam shovel, and when he was not fixing the fire or looking at the water gauge, he would wipe off the steel rods and polish the brass work till it shone. I showed him how to rig up a hammock, and he used to sleep alongside of it, with one hand resting

on the glass vessel, as if it brought him close to the ancient Mabut Rae.

"The road was finally built and paid for. I had everything ready to leave; even had a flat boat built so I could drift the steam shovel down the river and take it to my next job over in Indo-China. I knew there was going to be some kind of a celebration, but I never dreamed of what finally happened."

"The Rajah had to come. I never expected that, but when I heard of it, I had the men lined up in different gangs like a parade; I wanted to honor him as best I could, and at the head of the line was the old steam shovel. The natives had decorated it with flowers and it sure was a pretty sight. The mahout had steam up, and I heard later that he filled the oil tanks and had hidden several extra barrels of oil, lashed to the sides and covered with flowers. Perhaps he knew what was coming. There had been some talk about his whispering to the shovel at night—or some such idea—you know how the natives are when they get an idea in their heads."

"The Rajah came along the road at the head of his men and he was on a pretty white stallion. When that horse came near the steam shovel, he started to snort and tried to turn around. He acted as I have seen some horses act near an elephant. It made the Rajah mad and he lashed and spurred him and finally brought the poor beast up under the crane of the shovel. And then it happened."

"Ah!" sighed Wing Loo. "I can guess."

"Of course, you can. It was as plain as daylight to me after it was over. The crane swung around with the speed of an elephant's trunk and the shovel caught the Rajah right on the head and crushed his skull. Dead as a doornail before he hit the ground, and then before any of us realized what had happened, the shovel turned to the left and started up the mountain side on its caterpillar tread. You should have seen it go. My word! But it just went up, hit the crest of the mountain, and that was the last I saw of it. When I realized what had happened, I beat it for my steam launch, and I never stopped till I was safe on an American gunboat, because I was sure I would be blamed for the Rajah's death."

"I heard afterwards that they never did catch the steam shovel. The Rajah was not very popular and none of the troops was over-anxious to hunt for trouble. The news had spread and everyone was sure it was a god anyway, and so—"

Wing Loo smiled as he finished the sentence.

"And so the steam shovel is roaming through the jungles of southern Asia. What a wonderful ending!"

"You are right. Perhaps it is best to have it there. As an experiment, it was rather dangerous to the peace of the world."

"Perhaps I will repeat it some day, Smith. At least, it was an interesting piece of surgery."



*Lit with the flames that poured in great streamers from his glowing form, he dashed madly upward, in his lifted hand a tiny tube of quartz that blazed with a blinding white light, such as I had never seen,*

# The Arrhenius Horror

By P. Schuyler Miller

Author of "Through the Vibrations" and "Cleon of Yzdra!"

*ACCORDING to recent tests made by M. Becquerel, the celebrated French scientist, fern spores remained alive in a tube kept at 445° below zero, Fahrenheit. The extreme cold seemed to have kept them in a sort of state of suspended animation, from which 99% of the spores returned to active life when subjected to a warm temperature. This, according to M. Becquerel, proves that germs of life could survive the cold of space between the stars or any other degree of cold possible in the Universe. As to assuming the possibility of a silicate form of life—it is not so far-fetched, when you consider that silicon is the skeleton, may even be called the bones of the protozoa, the low form of living creatures. The Nova Pegasi is fictitious.*

Illustration by MOREY

"KELVIN."—"Absolute."  
"Life."—"Death."  
"Sleep."—"Tired."  
"Earth."—"Doom."  
"Ground."—"Soil."

"Arrhenius."—"Ion."

"Well!" exclaimed the psychoanalyst. "I thought you were perfectly normal—the most normal man I ever met. You went through the regular word-association tests like the most level-headed of men—not an important slip anywhere! And then I polish you off with a few more words—more or less haphazard ones—and I find this! Why should 'earth' bring out 'doom' like a jack-in-the box, in half a second under your norm, while old 'Arrhenius' takes four seconds and a half, very nearly twice your normal reaction time, to produce 'ion'? I give you 'Kelvin', and like a good, normal chemist you reply with his absolute scale of temperature. And then, when I tack 'Arrhenius' on the end of the list, for no particular reason, it takes you, a chemist, double your normal time to give me his ionic theory—one of the fundamental concepts of modern science! There's no doubt about it now; this is what has been keeping you on edge for the last two years, but, *why*? Come, I'm your doctor, just now, but I'm your friend as well, and an old one, too. Tell me what Arrhenius does mean to you."

"You're right," his patient replied, "Arrhenius doesn't mean 'ion' to me—not right off. It means Life—Life spores! God knows I have reason to make that association, rather than any other, but any man who goes into Africa with a companion, and comes out alone, with a handful of crystals and a mad story, learns to repress the emotions that are surging at his heart!"

"You remember Tom Gillian—a fresh when we were seniors? He went in for chemistry, like me, but he had money to burn, and he went in for travel, too. Then one day, as I was droning away at my crucibles, he breezed in, bronzed like a Rodin figure. He walloped me on the shoulder, just the way he used to do in the old days.

"'Bill,' he said, 'you have a holiday coming. I've found radium, and plenty of it, and you're the man who is going to come out with me and check my tests on the pitchblende—expenses paid, at an expert's salary! How about it?'"

"'You mean the Company is sending me, with you?'"  
"Nothing but!" he replied. "You are going to be the Company in an area as big as Texas, with Pennsylvania thrown in, and with less people than Greenland. Bill, I've hit on a deposit of radium ore that will make your eyes stick out! We'll have to fly it out, but if you check me, the Company is back of us, and we'll go halves on the job. Right?"



"Right enough!" I answered. "But where is this ore?"

"Ye gods! Didn't I tell you? It's in Africa, way off in the desert where no one but a half-wit white man would think of going. It's a whale of a place, Bill! 'Hell's Garden' I call it—just the sort of place Rider Haggard would have picked to raise a new race of fire-eaters. It's a big extinct crater, or maybe a meteor splash with a rim like the Andes and a desert plateau for miles around that has Death Valley on the run. Then you climb up and up to a narrow pass under the black cliffs and look down into the crater! 'Hell's Garden!' It's mostly marsh—the shallow, grown-up marsh that you read about, all full of great blue-green reeds and thick black water, with an island in the center where the outcrop is. They're like fossils, those reeds, chuck full of silica. A man could scratch glass with them, with no trouble at all. Well, you'll see it all inside of a year or less. If you think up a better name for the place, it's yours!"

"And so a year came, and went, and at last I found myself beside Tom at the topmost pinnacle of shattered rock that had thrust up in an enormous barrier out of the dead white heat of the desert. Behind me, long white dunes and bouldered stream beds writhed and leapt under the burning sun. About me, black crags thrust up in a jagged maze of rocks, into the pale sky. Below me lay the crater, 'Hell's Garden.'

"Down the slow slope from the abrupt foot of the barrier range ran a weird and wonderful tangle of bush and grass-tuft and squat tree, crowding up in triumph from the black sand among the black ledges. Thorn-tree and sword-grass and other plants that no man had seen elsewhere—parts of this unearthly monument that was the sanctuary, the stronghold of Radium, master of modern Man! Dull grey or slatey green was their foliage, but from every gnarled and twisted bough sprang a miracle of burning color—raw red and golden and royal purple—the blossoms of Hell's Garden.

"Then, as they sloped down and out into the crater's heart, they changed—became a sea of long grey-green grasses surging and billowing in the hot wind that seeped in through the guardian ranges from the outer desert, more than man-high and keen-edged as a steeled blade. And still farther, beyond them all, were the great reeds. Perhaps in a Carboniferous age they had been natural, but here and now they gave a strange feeling of isolation, as of another planet. Slender as a man's thumb, yet thrice a man's height from water to fronded tips, they sprang from the oily black mire of the swamp. Tall and slender, yet stiff and flinty as a forest of quartz spires, as hard as, and tougher than, the silica that was in them, forming a wall to dull the sharpest blade—a wall of blue-green between us and the dull black pinnacle on the horizon—our goal. And as I stood, I heard the voice of Hell's Garden—a threefold voice, of the sough of weary winds through a net of leafy boughs, of a hushed whisper of hurrying breezes in the grasses, keen as their lurking blades, and a voice of the great reeds, like nothing I had heard or imagined, save only the rattle of clean-picked bones on a rotting gibbet, dry and sinister, and harsh with a sort of lurking softness in it, with a shrill whine of crystal stroking crystal that ran through the clatter. Dwarfed tree and treacherous grass and chattering reed—the denizens of Hell's Garden!

"TOM was speaking. 'There's more to it than this,' he said, 'but the main show won't come off for some time. Come on, we have to reach the island by dark, if we want to keep the porters with us.'

"All day, under the blazing white sun, our little line of burdened men struggled down toward the center of the crater—down the harsh black cliffs by giant time-hewn steps, through the matted jungle of thorn-tree and twisted bush, into the realm of the sword-grass. Gashed by toppling blades of grass, we hewed our way through in a narrow, winding path between walls of shining green swords, won through to the marsh of the reeds. Narrow black ledges ran out like the backs of prehistoric monsters, wallowing in the mire. Straight and slim the reeds rose to the pale sky, their tips plumed with fronds of pale leaf-green, their glassy shafts ribbed with snowy white. Out over the black ridges we filed, two white men and a dozen laden blacks, with the malignant rattle and chuckle of the reeds all about us, then over hidden fordings, waist-deep in thick slime and fetid water to where the island's steeped pile jutted from the morass. Once, stumbling, I clutched wildly at a reed for safety. Like a dry bone, it snapped, scoring my arm and hand with its glassy sharpness, and all about the great reeds whined and chuckled as the crimson blood ran merrily down the glistening channel of flinty green to stain for an instant the thick black waters of the swamp.

"On the island was a little huddle of rude huts, built of piled rock from the cliffs that rose from a narrow beach to the pinnacle of the island. Somewhere, here in the bowels of this blasted mountain of black rock, was radium, the new god of Man, waiting to be wrenched forth by me and by the Company to make wealth for those who might benefit.

"Tom pointed to a gorge that ran back from the huts. 'The ore is in there,' he said 'or, rather, the outcrop. The stuff is everywhere underneath us, the electro-scope shows. I guess it must underlie the entire crater—too deep to harm us, but close enough to the surface to have some queer effects that I've never quite explained to my satisfaction. You can see for yourself, later. We have work to do now.'

"Night came. All through the blazing afternoon we had toiled to set up our rough laboratory in the largest of the caverns that riddled the peak. Tom had used it before, and with the few additions that we had been able to bring, chiefly electrical apparatus, it began to really resemble the thing it was supposed to be. Tom showed me something else, too, a five-foot disk of figured quartz, fused and ground during his last visit to this place. Above the camp, on the summit of the central peak, was his cavern observatory, where he sat alone and gazed through his great telescope at the glory of the African night. Three years he had been here, searching out the hidden lode, and in the long nights when the chuckle of the reeds drove sleep from him he had found rest and comradeship in the stars.

"As the veil of spangled velvet settled down over the desert, he led me from the little cave up a winding passage in the peak to the summit of the pinnacle, overlooking the marsh. On every side it glowed with a ghostly fire, like the fox-fire of the woods at home, phosphorescent green streamers leaping from the tufted reed-tops into the night, and vanishing. Like candles, or long slender tapers of a strange wax the great reeds



burned; flaming yet unconsumed. Beyond them, the girdle of sword-grass glowed paler, and farther still the dwarfed thorn-trees spread a net of fiery lace against the black of the crater walls, jutting great and dim against the Milky Way. All the mighty oval of Hell's Garden burned with that pale green radiance, save only the island where we stood. And, perhaps solely in my imagination, it, too, glowed faintly with a radiant mist.

"It's the radium," Tom explained. "The stuff is so plentiful here that everything fairly reeks of it, is energized right up to the hilt. There's too much for me to locate it with the electroscope—that's why it took me so long to find the main outcrop. It's quite a sight, isn't it? The blacks won't go out there at night. They think the lights are devils hunting for them—with lanterns, I guess. But I've been out. It's a great experience to wander through that sea of green fire, forming a luminous roof over your head that shuts out the stars. Up in the thorn-forest it's like a ceiling of fiery meshwork, but in the grass and the reeds there are only hundreds of huge candles, their flames leaping up and out into the universe of stars. It's a great experience, I tell you; one you mustn't miss. Some night, when you are sure you won't get lost, you must go, alone."

"A week later I was ready to go. For a month or more we were to be busy with the ore, but on this night we were free, and at midnight, with the proper mental set, I was to go out into the weird fire of Hell's Garden, amidst the demon-chuckle of the blazing reeds, and commune with the wonders of Nature. I doubted if I would get the kick out of it that Tom got, but I was willing to do my damndest. In the seclusion of our little laboratory we discussed matters of varying import, while I waited for my rather doubtful treat.

"What do you think of Arrhenius' theory?" Tom asked me suddenly, apropos of nothing.

"Well," I replied, "it seems to work. It's widely enough accepted, goodness knows, and it is reasonable enough to suit me—fits the properties of solutions to perfection, or nearly so. If we knew a little more about ionization in solids, and about what determines degree of ionization, I think there would be no doubt as to its validity—were you thinking of presenting an opposing theory?"

"Lord, no! I don't mean that! I don't intend to buck the ionic theory! I meant Arrhenius' other theory, the theory of life-spores."

"I never heard of it. What is there to it, Tom? It sounds good to me."

"It is good. I'm surprised to find that you don't know it. Arrhenius was worried about life—especially about whether earth was the only inhabited planet in the solar system, or the Universe. We didn't think so, but, as a chemist, he couldn't quite imagine life springing up spontaneously, everywhere, by an accidental combination of energized elements, and he set out to devise a theory of transmission of life from one planet to another, and from star to star.

"He hit on a fine one, too, theory of life-spores, so to speak. You know that many of the lower forms of life are practically infinitesimal in size, like the bacteria, and consequently of great surface, relative to their mass. You know, too, that they can exist under the most trying conditions. Bacteria have been found thousands of feet down in the Earth, in the oil shales, and up in the

topmost levels of the atmosphere. They have been frozen, dried, sealed in a vacuum, and lived on quite happily in a state of suspended animation. Not only the lower forms of life, but high forms, plants, act much the same. Look at the minute spores flung out by fungi and ferns and mosses, wafted away, God knows where, by the slightest breeze. Look at the grain found in Egyptian and Peruvian tombs, reaped and stowed away in ancient tombs thousands of years ago, and growing again when it is planted today. Look at the frogs and fish that have been sealed in rock or frozen in ice, and lived again. Darn it all, Bill, life is the hardest thing to destroy that you can imagine, if it is protected rightly!

"Arrhenius knew of all this, and it gave him a working basis that made the building of a theory simplicity itself. Imagine a little clump of lichens, Bill, clinging on some mountainside. One day its many little red and blue cups spring open and spew out millions on millions of tiny, invisible spores, seeds if you like, potential life. The up-draft of the mountain slope whisks them away, scatters them over the crags and cliffs, then bears a few off into the upper reaches of the atmosphere. Some come down with condensing rain and hail, some settle slowly in some other part of the globe. Some never settle, flung from level to level of the atmosphere by the jostling, battering molecules of the air. But here and there Bill, a microscopic spore escapes entirely!

"Beaten back and forth by hurtling molecules of hydrogen and helium, it one day reaches the edge, the limit of the corporeal earth, and speeds out into empty space. Now the blazing sun comes from behind the eclipsing earth, and the full power and glory of its light catches the tiny voyager in space, bears him off, as it bears the filmy train of a comet, out, out from sun and earth into the star-flecked emptiness. Some day a heavenly body checks its course, another atmosphere, and it settles to the ground or is flung again, to wander anew. Somewhere, on Mars, on Jupiter or Neptune, perhaps on another star or another universe, life has come to rest! And one day it finds food and water and warmth, and the new planet finds a tiny fleck of grey-green lichen growing and spreading—a messenger from earth!

"THAT is Arrhenius' Odyssey of a life-spore, Bill. Quite a story, isn't it? Think of the dust spouting up from our cities daily—bacteria, tiny parasites, little lost fern spores and moss spores. Some fall back—most of them—to plague housewives, but here and there one escapes, and here and there one finds a new home, and evolution starts its inevitable course toward the top. That is Arrhenius' theory, Bill. Think what it means—life driving out from the great suns to the small, from the mighty galaxy to the little star-cloud, diffusing into space with every minute and second of the day, from every center of life. There need be only one accident, Bill, or one Creation, and life will go out to all Space!

"It's fascinating to me, Bill. Think of the infinity of varieties of life that must arise in this boundless Universe of ours! Think of the vagaries of evolution that may produce a ruling cabbage, or a ruling worm, or something no man has imagined! All about us they may be evolving and sending out tiny messengers into space—messengers that will some day reach our little earth and contest the life they find here. Even if Man

never succeeds in plumbing Space with his rockets, the mighty traffic of life will go on! Look up there, Bill, where the stars are blazing. Perhaps even now—*Gee, Gosh!*

"He sprang to his feet like a madman. I had been listening drowsily, half hearing, half wondering how to avoid giving up this comfort for a mad scramble through the reeds and sword-grass. Now I, too, leaped to my feet and looked after him, to where he was scrambling up the rough slope to the telescope. Then my gaze rose to the stars above me, and on the instant I was tearing wildly at his heels. Blazing brighter than anything I had ever seen, brighter than any planet or meteor, shone a great new star!

"You recognize it, doubtless, as the great nova in Pegasus. It was nearer than any other star known, barely a light year distant, and was visible even in the light of the day, though it was only twenty degrees from the equator. For two months it blazed in the great square of Pegasus, then vanished as it came. For two months every telescope on the earth was fixed on its pure white glory, and men of science measured it, and weighed it, and delved into its secrets as never before Man had studied a star. With our sixty-inch reflector, in the giant crater of Hell's Garden, it shone directly overhead, and we watched and measured and photographed, while the natives beat their bull-hide drums and moaned in fear and worship. We saw, too, the veiling of its light as earth swung in its orbit so as to bring before its face the great cloud of cosmic dust, remains of a long-dead, burnt-out star, that hung between the two suns, slightly over a million million miles away. Through its veil, the white fire of the nova was reddened and dimmed, but still it was the brightest object in the skies, save only the sun. Weeks before that first night, with the driving blaze of the new-born sun behind them, these cosmic voyagers must have set forth, whirling their lengthy way through space at nearly half the speed of light, but it was not for over two months that a few of them reached their goal and sank in the shadow of a wheeling planet to their new domain.

"During the burning heat of the day we mapped the lode as best we could, and assayed samples of the ore that our mining produced, pitchblende fabulously rich in radium. During the long nights we gazed wondering at the star that hung like a mighty lantern overhead. Then, one night, it winked out as suddenly as it came, and the square of Pegasus gaped empty. Three days were gone since then, and we sat high on a pinnacle of the western wall, the sun at our backs, looking out over the varied garden of the crater to where the shadow of the central peak crept along the seared black dial of the eastern rampart.

"I thought of that night, less than a week before the great star had disappeared, when the heavens about it glowed faintly red, over a large area, as a swarm of tiny meteors reached the denser strata of our atmosphere. Tom had said that they might be motes from that dark dust cloud that hung in space before the nova, driven by the pressure of light with velocity great enough to give an appreciable glow as they flared into light and disappeared. I wondered if, perhaps, one or two of the millions might have survived, too large to fuse before their fall was checked, or too small to suffer the friction of the air.

"At the thought, my eyes turned upward to where the

great star had so lately burned, and as they fell back from the empty whiteness of the sky, a tiny lance of light struck their gaze and held it. High above the desert, a speck of light was drifting earthward, scaling in long slow spirals out of the cloudless heavens, floating idly in the hot east wind from the desert that parched our faces and bleached the hair straggling from beneath our sun-helmets. Lazily it fell, like a dropping leaf, rocking from side to side in long, shallow sweeps that covered miles in their easy flow. Mentally I envisioned a tiny flake of crystal, atom-thin, gliding in the long inclines of the winds, the glory of the sun reflected from its polished faces. From what desert of earth had it been swept up by the wind that now bore it so gently downward? Or had it been wafted by winds of the ether, light-eddies that swirled among the stars? Beside me Tom pointed to the north, where a second mote of light sank like thistle-down to the desert. The wind was rising now, and shifting from east to north, and as its gentle sighing among the thorn-trees rose to a keening wail, the chatter and whine of the reeds rose to our ears from beyond the rippling billows of shadow that stroked the grasses. Dust was whirling up, darkening the sky beyond the farther wall, and the twin motes had vanished. Then, far below in the heart of the marsh, the sinking sun struck an instant glint of light, tiny and shifting, that sloped down among the reeds and was gone. Hurriedly we gathered up our packs and sought shelter from the wind-driven sand that was scoring our faces as it had scored the black crags for untold ages.

"The recovery of radium from pitchblende is not an easy task, especially when you must synthesize such chemicals as you cannot easily transport to the location of your deposit. We were isolated in a desert crater, at least partially volcanic in origin. We had a hot spring supersaturated with carbon dioxide, at very nearly 300 atmospheres of pressure, that could be and was capped, and so controlled for our use. We had sulfur banks, in the crater itself, and two days into the desert were the remains of a great salt lake, now but a scale of blinding white against the less white sand. We had the tools of the chemist, and we needed no more.

"The sulfur was burned, and the resulting dioxide returned to trioxide, and dissolved to form sulfuric acid, which we distilled to increase the concentration. Tom had this all ready to run, from his former visit. In a chamber over the sulfur kilns, using the heat of combustion of the sulfur, we ran our Haber nitrogen fixation, rather crudely, but well enough for the purpose. Nitrogen from the air, and hydrogen from electrolyzed water united at about 700 degrees Centigrade and 50 atmospheres of pressure, with iron dust as catalyst, to form ammonia. From this we ran to our Solvay cell, producing sodium carbonate. Strong brine was saturated with ammonia and carbon dioxide, under the highest pressure we could reach. The sodium bicarbonate that precipitated was heated to convert to the carbonate. Finally, from salt and sulfuric acid, we made hydrochloric acid.

"All this was merely preliminary to our real work—the extraction of radium from pitchblende. There was a little over half a ton of ore available in loose form, and, from the preliminary assays, we hoped to produce nearly half a gram of radium, or, what was equivalent, sixty-five hundredths of a gram of radium chloride, really a huge yield.

"In pitchblende, the characteristic uranium ore, radium, with other metals and some of the rare earths, is in the form of sulfate. This we roasted with our sodium carbonate and treated the resulting carbonates with sulfuric acid, converting the salts back and forth from sulfate to carbonate until only radium and barium were left of the original metals. Now came the ticklish part. The radium and barium carbonates were run over into chlorides with hydrochloric acid, and the salts crystallized out in small cells, in the hot sun or in the blast from our sulfur burner. First came the radium chloride—tiny white crystals that were washed and recrystallized until they shone like little needles of frost, then put carefully away in quartz tubes and stored in a container of thick lead. Then the barium chloride would settle, crystals of the same sort, but colored by the radium to a yellow or pale orange or delicate salmon. Again they were dissolved, and again crystallized, until the barium salt was almost as pure as the precious radium in its lead casket. Gnomes we must have seemed, robed and hooded in cloth of lead to protect us from the harmful rays of the radium, as we bent over the little porcelain dishes of gleaming, faceted prisms, sorting the treasure from the dross, and stowing it away with elation in our hearts. The blacks feared us as they feared the luminescence of the crater—with much of awe for the white demi-gods who played with light and life. For once Tom had cured a tumor for their headman, in the days of the first expedition, and the man had stolen the white chief's medicine and died horribly of the burns from the radium, tucked, in its little quartz capsule, into his loin-cloth.

"For days we were absorbed entirely in our work, moving from hut to laboratory and back as in a dream, mechanically, dropping to sleep like men dead after the heat and fumes of the laboratory. Twice, the blacks tried to bolt, but herded back again in fear of something we had neither time nor inclination to examine. Then came the day when we looked fondly at the little group of tiny quartz tubes, sealed upon their precious burden, and left the acid-saturated air of the ill-ventilated cave for the summit of the central peak, to look again at the glory of the outer, greater universe. For a while we scanned the heavens, then lay quiet upon the upper terrace, dreaming the dreams of the successful.

"DOWN from the crater's towering rim rushed a little, hot breeze, fanning our hair and beards gently as it passed. Out over the marsh it danced, and back to our drowsy senses came the rattle and whine of the great reeds, and the rustle of their plumed tips, lit with the wan fire that burned through all the crater, witness to the hoard beneath. Half asleep, I listened, making of the sound a fairy music, albeit a 'Danse Macabre' of the gnomes, delving as we into the treasure-chest of Mother Nature—a bone-dry rattle of flinty castanets and piercing wail of pipes and fiddles—the music that had become familiar in months past. In my mind's eye, I saw the little orchestra, capped with dancing fox-fire, scraping and piping and rattling to an unknown uneasy tune, old as the moon, and now I seemed to see a new musician in the group, slim and green-clad, bearing little festoons of crystal bells that swung to the rhythm of his capers and chimed and tinkled in sly glee at an ancient trick, played by the elder gods on Man, in hiding away the riches of the earth to be a source of hate and

strife and bloodshed to eternity. Where had he come from and when, this elfin bellman? Where did the impish crystal dripping of his bells fit into the mad symphony of the crater? Drifting up as from a great depth, the question bore me out of my dream-world into reality, a reality where tall plumed reeds chattered and screamed their dismal dirge, and where a faint striking of crystal on crystal, whose chiming carillon danced liltily, floated to us on the breeze.

"Tom sensed my waking. 'Hear it?' he asked.

"'Yes.'

"'It's new. Perhaps it has been here for some time, since we have been working, but not before. It's a queer sound, isn't it, like little bells—like the little silver bells on a leper's hood. I wonder what turned the blacks back, after they tried to bolt. That's quite a problem in itself, if you stop to think of it. And I wonder what makes that tinkle. I didn't hear it when I was here before, or this time either, until now. We'll have to try and find out, tomorrow.'

"I raised myself on one elbow and looked out over the flickering fires of the marsh, toward the spot whence the elfin ringing came, trying to see through the green haze what manner or source it had. It seemed that out there the light thickened and changed hue, melted from the pale blue-green of the reed-fire to a warmer shade of violet, with much red in it. Out there was the trail to outside, the trail the blacks had taken, to return in sullen awe and fear. I had never yet been out there at night, when the radium-born light danced overhead among the slender reed-tops and clung about one in a fiery mist.

"'Tom,' I said, 'do you feel like finding out now?'

"'What do you mean?'

"'Look there—no—over there, by the trail out. Yes, there. Do you see anything—a light?'

"'No. I don't see—oh, by Jove, I do. You mean a sort of reddening, purplish, in the green? It doesn't waver so much as the rest, but flickers, like a candle, pulsing up and down, so to speak.'

"'Yes, that's it. I think it's near the trail. I remember that ridge over to the left of it. We could try, anyway, and I would see the swamp by night, even if I'm not alone. What do you say? Can you find your way out, and back again, in the dark?'

"'Sure! It would be hard to lose me here. I'm game to go, if you are. It should be interesting, to say the least, for I'll swear that that tinkling is brand new to the crater, and so is that glow. Did you notice, it has a sort of carmine tinge, like the radium spectrum? The energy levels ought to be about the same. Let's go. Bring down the robes, will you? They ought to be in the lab.'

"'Great! We'd better wear boots, and I have a hunch that the small kit will be handy, if we can find a place to set up the spectroscope. I'll go and get it, while you orate to the porters.'

"The porters, especially the headman, did not at all cotton to our idea of wandering out at night to beard the bellman in his lair, but what they couldn't help they couldn't help, and they stayed put. Just for a moment I caught a queer glint in the little eyes of the headman, but it faded quickly and I thought no more of it at the time.

"We clambered with difficulty down the steep slope of the island to the narrow beach of fallen rock below, then

skirted the edge of the murky waters until we reached the place where the trail came out of the swamp. All around the island was a broad belt of open water, but only here was it shallow enough to permit crossing without a boat of some sort. Tom had explored the entire crater during his former trip, and we had gone over part of it together since, trying to trace the submerged lode of pitchblende with the more refined instruments that the company had provided. Just here, a narrow dyke ran out under the water to the reed-beds, where a zig-zag path of dykes and fords led to the distant shore. As we plowed steadily through the viscid water, it sent back to us a little malignant, chuckling gurgle of glee to blend with the rattle and whine and tinkle from beyond.

"At last we were in the reeds, and making our way along a low ridge with the black ooze stirring sluggishly at our feet, lit with a misty phosphorescence that hung low over the surface, where a thin scum of algae lived its stagnant life. On either hand the thin columns of the reeds showed dimly through the luminous mist, more blue than green at this closer distance, like tall slender rods of banded glass. A few feet more above our heads the ribbed stalks broke into great plumes of feathery filaments, slender as tongues of green flame, from whose every needle-point played the pale ghost fire of the marsh. Like the corpse-candles and will-o'-the-wisps of old lore, they flickered aloft and vanished—pure energy from the hidden radium rising through these flinty veins and leaking off into the air of the crater, exciting it to vivid but pale, greenish blue fluorescence. Here and there, where a plume was more compact, the green burned like a giant taper in a long, pointed peak of light that faded at its edges into nothingness. Even now we began to sense the supercharged quality of the atmosphere, and we seemed to see an uncanny bluish lustre of decay veiling our exposed skin. Indeed, our teeth and eyeballs were already glowing dimly, giving us an unearthly appearance, such as must have driven the blacks near to madness on the night when they fled for the second time, to creep back sullenly with crazed fear in their blood-shot eyes. We saw only weird beauty in this fairy play of light among the great reeds—they saw the lure of demons, soul-sucking and hungry. Perhaps, after all, civilization is merely a growing sympathy with the world whose phenomena have impressed themselves upon the mind of the race.

"For over an hour we wound in single file through the unmarked byways of the marsh. Now our faces were less plainly lit in the bluish light. The water glowed no longer. The thin haze of leakage from the joints of the reeds no longer outlined their slender stalks with blue-green fire. Even the discharge from the plumes had lessened considerably. It was as though some great reservoir of energy were sucking up the radiation of the hidden radium, deflecting it from the reeds as a magnet will deflect steel, or a mirror focus light. I wondered what new horror of the swamp had warped the structure of this portion of Space so as to focus on itself the energy of the swamp. I was soon answered.

"We had perhaps an hour to sunrise; an hour in which to discover the source of the strange light before the glare of the African sun should blot it out. Now only the tufted reed-tips glowed wanly green. The sky ahead, between the blackly silhouetted stalks, was stained with a carmine glow, mingling with blue to give a rich,

deep hue of purple. The tinkle of crystal bells rang nearer, rising above the clatter and dismal wail of the reeds, loud and clear. It had not the elfin enchantment that distance lent it, now. It was part and parcel with the other sounds of Hell's Garden, evil and exultant. And now we could hear that it came intermittently, with none of the measured symmetry of tolling bells, myriad sharp clashes of crystal on crystal, with a faint, tense twang accompanying them. And, too, utterly inaudible at a distance, came now a thin vibrant singing of tense matter, taut and keen, adding to the clamor of this goblin orchestra; a new note, that sent a little chilly thrill up my spine.

"The ridges wound in and out among the tall, silent reeds, even their whine and rattle lost in the presence of this great unknown vampire of the marsh, feeding upon their energy and their life. I fancied that they were less stiff and rigid, drooping under the energy-hunger that was consuming them. The purple light filled all the sky before us now, the reeds standing black and dead against it, and the clang and hum had risen to the clamor of a forge. Waist deep in liquid mire, we floundered on, the oily black surface throwing back the glare from the sky in little darting flashes of red and purple. Then, suddenly, the path turned, the dense curtain of reeds fell back on either side, and the secret of the marsh lay before us.

"Like a dense fog the mist closed down on us, rich purple shot with flares of carmine. Where it bathed the rampart of reeds, the tall stalks crumbled and fell, limply, with no clatter of flint on flint, yet we felt no ill effects, save a faint thrill of energy coursing through our bodies, as in a highly electrified atmosphere. However, when I opened the kit later, to use it, the prisms and lenses of the portable spectroscope were gone—dissolved into empty air. It was hard to see through the thick luminescence, that swathed and hid whatever lay at its heart, and we pressed on through the dark water into the center of the great cloud of light. It must have been like a great hollow sphere, a hundred yards or more in thickness, for it seemed an eternity before it thinned and vanished utterly.

"BEFORE us lay a fairy mountain of crystal, a faceted wilderness. Of every crystal form known to Man they were, hexagonal and triangular prisms, steep pyramids, thick-based obelisks and slender minarets, all of transparent flashing crystal. From the black water they rose in a huge jagged pile, hundreds of feet to where the stars were blotted out in the purple light-haze. And from every peak and pinnacle, from every needle-tipped spire poured great leaping tongues of carmine and sapphire flame, that met and mingled in the purple of the haze.

"Not like the slow seepage of the reeds was this, but a vast conflagration of escaping energy, blazing fiercely. The crystals glowed from within with a clear white light that seemingly fed the flame-tongues pouring from every angle of the mighty mountain of crystal, hurling forth the life of the swamp in great streamers of red and blue fire that danced and leaped from crest to crest and from crest to glowing purple haze hanging low above in a shrouding, concealing blanket.

"'God!' cried Tom in a stifled voice. 'The energy of it! Bill, man, have you ever seen the like? Bill, it can't be earthly—it's too huge, too colossal for earth. It



would drain our little planet of energy and life, and leave it an empty husk in Space! It must be from beyond, from out there among the stars and galaxies. There are worlds out there that no man may imagine, or even dream of—'

"Tom!" I shouted. "Tom, can't you see? It's moving! It's growing! Tom, that *Thing* is alive!"

"All the great tumbled heap of crystal was stirring slowly, uneasily, with life. Huge hexagonal prisms were swelling visibly, rising toward the mist above. Now a broad facet burst with a shattering clang, and a slender triangular shaft shot from its face, out and diagonally up, blue glory streaming from its tip. Now a thin rectangular column was thrusting up and up, with uncanny speed, from the very summit of the pile. And now a second shaft was darting toward it from one side, catching it square, bringing it down with a clash of crystal on crystal, even as new and different forms sprang from its shattered base. And as it grew upward, the great mass spread outward, toward us, with that steady creeping that gives the impression of awful relentless speed and purpose. Often, in years gone, I had dropped crystals in a beaker of water-glass, sodium silicate solution, and watched them swell and send up pseudopods in a weird semblance of life, forming a strange submarine garden of sponge and sea-fern and tentacled polyp. But they were but phantoms of solidity—fragile shells filled with dense solutions, while these things, growing with the same strange speed, were solid throughout. In my mock-garden, the water-glass had fed them the silica that made them grow, but here—I did not know. It must suffice that they were growing and spreading from some hidden central source, with the twang and clash of striking crystal, and the high hum that told us that the whole great body of the thing was vibrant with energy, and with something akin to life.

"For this was no mechanical growth, as in the test-tube garden. I sensed that at once. There the crystals were surrounded by a medium that supplied them automatically with the materials of their growth. Here there was only the air and the shallow water, but here was that alien element that upsets all the carefully delineated laws of chance. Here was life.

"I remembered the purple mist, fed by the energy that poured from these living crystals, energy of radium, drained from the marsh beneath. I remembered how it had caressed the ranks of the reeds, and how the slender stalks had drooped and sunk rotting into the slime, stripped of their silica. And I understood the power of this thing. For out of the marsh, out of the earth itself, it was sucking the energy that meant life, moulding that energy into the glory of flame that it poured out from every facet and crest into the great hollow sphere of purple light-stuff that surrounded it and fed it with the silica that was stripped by some strange action from the great reeds. Beyond all doubt, this crystal monstrosity was alive, intelligent, as we—or even more so. And its purpose was conquest.

"Tom spoke, his shout, a thin piping above the din. 'I think it's the radium, Bill. Maybe it has never had such a store of energy before, in its parent star. Here the entire crater is built on a foundation of nearly pure energy, and there is silica to boot, plenty of it, in the reeds and the desert around. I think, if it grew more slowly, more normally, there would be more form, more regularity, more system to it. There would not be those

ruptured facets and broken columns, but an orderly array, an intelligent array, with some show of symmetry.

"Now it's haphazard, uncontrolled, energy-drunk. Its will, or mind, or whatever it has that corresponds to our conception of controlling intelligence, is submerged in one grand orgy of unrestrained growth. I wonder what will happen when it strikes the parent lode, down under the swamp. There will be a crisis, certainly. A man cannot indulge without limit, nor can a crystal thing, I think. It will be a wonderful sight, whatever happens!"

"Tom, where do you think it came from? I have an idea, a wild one, but it seems to fit. Do you remember that day on the rim of the crater, after the nova appeared? Do you remember those two motes of crystal, little crystal scales dropping from the upper atmosphere—from space, perhaps? I think they were the seeds, the life-spores of these things. The light of the nova drove them here, Tom, from some dead sun out there in space, some sun that they have sucked dry, then gone to seed, so to speak. Arrhenius was right!"

"But Bill, these aren't like ferns, or moss, or bacteria. Those were the things Arrhenius meant—low forms of life, with tiny spores that air and light could carry easily. These are crystal, and intelligent. I think they may well be as intelligent as we are. You don't see the lower forms of life getting power-drunk! I agree that they come from out in Space, but of their own accord."

"Listen here!" I cried. "There's nothing on earth—or off it, either—to prevent intelligent life from propagating by spores. If you ask me, it's a darn sight more brainy to have young that can handle themselves right off the bat, than to breed parasites that are absolutely useless for most of their life! Man would be a great deal more efficient if he could fertilize a cell and let it go at that, with no more worry and pain, like a fern. But Man can't do it, nor could most of the animals, and still be animals, because it would make him hard, emotionless, crystalline—like these things. I'm not kicking, Tom. I wouldn't change places for all the world. I just wanted to show you that intelligent life can reproduce by spores just as well as plants and moss. It's just that they are put together differently, mentally, so to speak. As for crystal spores being too heavy, that's nonsense! You've handled enough mica to know how thin and light it is. Even a light breeze can pick up a flake of it. And their spores could be smaller and thinner and lighter, very easily!"

"You win, I guess. It sounds reasonable enough. But you jump at conclusions too easily to suit me."

"Says you! But let's go back to dry land. With the prism gone out of the spectroscope, there's no sense in staying here in the mud forever. Besides, this thing gives me the willies. It isn't safe. You can't tell what the thing might do if it sobered up and started to balance accounts. I have a sneaking suspicion that we would be quite unnecessary to its scheme of life."

"To tell the truth, wonderful as the crystal creature was, and curious though we were, the incessant din and the flow of raw color had put a rather severe strain on us. Also, it was nearly morning, and we had not slept for nearly two days. So back we went, floundering through mud and water, to the outer rim of the purple haze. The eastern sky was brightening, and the density of the haze had begun to decrease, so that we could see



the crystal monster dimly through it. As we reached the edge of the reeds, we stopped to look back. The western wall of the crater was already in the light, and as we watched, the sun sloped up above the eastern crags, drowning out the purple mist with its brilliance. But most beautiful of all, as the first rays struck the great mountain of crystal, it burst into a glorious blaze of intense color—deep blue and peacock green, pure gold and vivid scarlet—a leaping sea of colored light, tinted and hued, such as no man had ever seen before. Every pinnacle was afire with the cascade of color that played about the great heap in a mighty halo of light, dazzling, coruscating. We were forced to turn our blinded eyes away, the pulsing beauty of the scene still before them in after-imagery, and turned back into the winding way among the reeds.

"It took perhaps an hour, in daylight, to struggle back through the mire to the island. We were worn out, and dazed by what we had seen. Tom shouted for the headman, then again, angrily, as the old fellow failed to appear. Impatiently he strode to the cleft leading from the beach to the upper rocks. Here, in a huddled semi-circle, clustered the rude rock huts of the blacks—silent and empty. The ever-burning fire before the hut of the headman was black and dead. And the mound of cases, that were our supplies, had shrunk nearly to nothingness. The blacks were gone. Gripped by superstition, they had plunged into the swamp on the side opposite the crystal monster and vanished forever.

"There was food enough left to carry us for months, for we had brought supplies enough to last all for nearly a year, and a good portion of it was left. The blacks had traveled fast and light, as any man will when fear grips him. So it was, after a deal of ineffective fuming and invective, that we decided to stay on as long as we could, and see the thing through.

"**T**OM put it to me plainly enough. 'You see, Bill, we're safe enough here, and this thing that's happening is important! You saw how that crystal thing eliminated the reeds, and how it grew. It did the same thing to your watch crystal, and the spectroscope. It may run out of silica, and it will probably run out of radium, but suppose it gets out of the crater, into the desert? Think how it will feed on that sand—pure silica! Think of it growing, spreading, flooding over the entire world and wiping out Man's civilizations like so many grease-spots! I tell you, Bill, this thing means business, conquest, and it's up to us to stop it!'

"We stuck. It is true that I wasn't fully in sympathy with Tom, though I didn't like to run any more than he did. Still, I felt more like fighting it with an army behind me, with dynamite and hydrofluoric acid, and an air squadron, but it would take two years at the least to go out and return, and the Thing was dangerous! And suppose they didn't believe us—or locked us up in some mad-house!

"Lord knows it was dead business sitting there like two lumps of baked mud, waiting for—something. I thought of the Colossus of Memnon, staring for dead ages out over the swelling dunes that emperors of two lands had held dear, chanting their dismal adoration of the sun until Time choked their dry tongues with dust and decay. Like them we were, two dried relics of a great race, staring out from our ledge over the desolation of the swamp, in our ears the death-rattle of the passing

of the reeds. For we had no plan. Our decision had been heroic, but blind.

"By day we floundered around in the rotting swamp that bordered the Thing, watching its awful beauty and horrible life, like birds fascinated by a serpent—two tiny grimy specks cowering before a god of flashing flame. By night we crouched on our ledge before the cave, talking blindly of the things of which men babble so wisely, listening to the crystal clangor growing ever mightier in our ears, gazing at the purple haze that crept about us. And we would sleep where we sat, when talk was done, and in the morning be drawn again to the hellish lode-star in the swamp.

"Like children or memory-stricken ancients, we made mighty plans and mighty decisions in those blind watches of the night. Utopias were raised with love and care from the dust of warring races, rose and fell again in shattered glory by the power of a word. A Universe passed in review before our judgment seat, in past and present and unseen future, the Universe of men, of Man, as the mind of the race comprehends its meaning. And in an hour or minute it had faded into emptiness, leaving only a Law, a Plan, for which we groped in vain. But ever our thoughts returned to that beyond in the swamp, to what it signified and what it implied, and we would grow silent and wait in blank despair for the unknown.

"Tom, somehow I feel that you've managed to get on the outside of the thing, that you understand it, and can feel the way it does, if you try. If you were it, what would you be afraid of? Come on, Tom, get along. How do we lick it?

"What is it afraid of?

"I don't know, Bill. It's weak, somewhere, I suppose. I wonder what it is—fire, water, cold? It probably thinks ours is a nice little planet as planets go. There's no annoying competition, no race that can hurt it or disturb it; plenty of food—quite a decent little planet, after all. It will squat here, king of the world, and gorge and gorge—go on a regular spree, and get blind-drunk on free energy. *Man, Bill, I've got it!* But you knew all along! Come on! We'll smear that critter all over this part of Africa before we're through! And, man, what a sight it will be!

"His plan was not at once evident, but as soon as we began to work on it, I saw what he meant to do, and my guess was confirmed by Tom himself. We set up an electrolytic cell of fused quartz, using a platinum anode and a cathode, or negative electrode, of pure distilled mercury. Into the cell went our precious crystals of radium chloride, dissolved in distilled water, the purest we could provide, and the current was passed through. We ran at ten milliamperes, or one hundredth of an ampere, for a little over the requisite six hours, in order to make sure of getting all of the precious stuff possible. Then I set up a little mercury still, and, swathed in extra coatings of lead impregnated cloth and hoods with an extra thickness of lead glass in the goggles, we transferred the mercury from the cathode chamber to the still—no longer pure mercury, but radium amalgam. We distilled off the mercury slowly and carefully, for now an accident would be fatal, meaning utter loss of that for which we had labored so long. Even more must we be careful not to let our hydrogen generators fail or catch fire, for this distillation must be performed in an atmosphere of highly combustible hydrogen. Eagerly

we watched as the little pool above the flame grew smaller and more solid, watched the tiny drops of mercury form like sweat on the walls of the long condenser and trickle in swelling rivulets down its tight spiral to form again a tiny puddle in the receiving chamber. For the most part we watched silently, modern alchemists garbed in the mysterious shrouds of our trade, waiting for the Philosophers' Stone of this latter-day world to form. To break the strain, we talked in spurts and starts, our interest lagging again to the process before us. Tom wanted to make sure of a full yield, and so we stopped three times to transfer the distilling mercury to the cell or to bring new from it to the distilling chamber. The life of a world depended on our getting every possible bit of radium that we could, and had not time been so deathly short, we would have returned to the outcrop to try to gouge more of the oily black clay from the rocky walls and pass it through all its long, arduous process of purification. However, there was not the slightest possibility that two men alone could perform that tedious task in time.

"ENERGY is a wonderful thing, Bill," said Tom one day. "Probably it is the only thing, aside from Space and Time. In a way, it reminds me of the old gods of pagan legend, who would descend to earth and go about making themselves manifest to men in a thousand different forms, as often as not to the ultimate ruin of the race that was 'honored' by their visit. Think of the forms in which men have detected its presence, in light and heat, all the invisible ranges below the infra-red and above the ultra-violet, in mechanical and chemical work, in electricity and magnetism, and from these in matter itself—matter the indestructible! Out there in those myriad suns that light the Universe, electrons are being stripped from their parent atoms, the protons and electrons of the nucleus are crowding together, coalescing into infinitesimal spurts of energy, quanta of vibrations, that hurtle out into Space at a speed that nothing may surpass in this Universe, until one day, ages after their conception, they reach one of the planets of a little yellow sun, seek out two representatives of an egotist biped race, and through their eyes and skins are transferred into nerve energy, making themselves known.

"Every hour, every second of every day for untold ages those great suns have been pouring out their radiation, their life-blood into space. Here and there it reaches port, is transformed, and starts once more on its journey. With every instant the great furnaces of the stars are cooling, dying, and the cold dead bodies that litter Space are drinking in the energy that they pour out and coming to life, only to pass through the cycle of radiation and die anew. That is the terrible 'waermetod,' the 'heat-death' of the Universe, Bill, when all Space shall be at the same temperature, the same dead level, and energy may no longer flow or be transformed. For energy must flow downhill, from high to low, hot to cold, light to dark.

"There is a hope, a slim one, for the Universe, promising near immortality. Millikan has detected radiation driving in from open space, from empty blackness—energy created, it would seem. But that may not occur, so far as Man can understand the laws of the Universe, so he has measured the radiation and delved into the mechanics of the atom, and he has found that out there

in Infinity, in emptiness, energy is coalescing and condensing to form the building-stones of the Universe, the protons and electrons. And in turn these are meeting to form atoms of hydrogen and helium, which unite to give heavier, bigger atoms, and in so doing lose great gouts of energy that sink through many feet of lead, energy more penetrating than anything Man has found—the cosmic rays. Hydrogen, helium, even silicon and iron, Millikan sees out there, building up in nothingness, and there may be yet others—copper, zinc, silver, even radium and uranium and unknown elements beyond.

"For ages they will build up and collect to form new worlds in Space, and then the degeneration will begin once more, radium breaking down through endless ages to lead, other elements with periods no man has detected dropping down, down to hydrogen and death. But always, out in Space, new worlds are being created. It may be a damped cycle, Bill, each time building up to a point just lower than the last, each time dropping away more slowly to the inevitable 'waermetod.' In our own world, there is nothing beyond uranium, which in itself is sinking slowly through isotopes of ionium, radium, niton, down in five billion years to lead, and in unknown, untold time to hydrogen, lowest of all the elements. In the past, perhaps, there has been a Universe of elements higher than uranium, that broke down quicker, while our world was building up to uranium. Now still another is rising, to silicon, to iron—perhaps no farther. And it, too, will die away, and others rise and fall to the awful 'waermetod.'"

"Still, I have hope, Bill. There is an energy form that obeys laws of its own, that has a driving power above Nature—that has Will! I mean that which we call Life—common in amoeba and dinosaur, in plant and in Man, and in that Thing out yonder. Water flows always down hill, unless Nature raises it by evaporation, but Man knows no level. Nature needs eternities to break down the elements, but Man does it in seconds with his cathode rays. Life must change the cycle in some way, Bill, how I cannot tell—for good or for bad. And yet, Man cannot build up the atoms that he destroys, but that day will come! Nature has cared for this emergency by scattering Life very sparingly through the Universe—yet we know that it can travel on wings of light through the empty space that hems it in. Some say it is but a disease of rotting planets; others think it divinely given by a Creator. Both are right in some way, I suppose. Man can delay the end indefinitely, if he tries—but Nature has her little tricks, and it may well be that Man will not delay but hasten the last awful dissolution. Life is the one controlling, uncontrollable degree of freedom in this Universe. God knows what it will do.

"Take this crystal thing out there in the swamp. It is a marvel of life and intelligence. It can control energy in ways that we men cannot even guess of, but Bill, it *can't* control itself. It is off on a cosmic spree, gorging on energy, spewing it out in awful waste, lost in an orgy of blind drunken growth. And right there I have it, Bill! Sooner or later it's bound to strike through to the lode under the crater and plunge in a mad growth that may kill it right then and there. Whatever happens, it will be right on the edge of a crisis. Probably it could live on with the pitchblende and maybe recover in time. I don't know. But, Bill, suppose that when it

is right there on the fence between existence and destruction, I gave it a shove—to the left! Suppose I feed it this radium—all at once—half a gram of energy on the brink of disruption, energy enough to blow up a planet and shake a solar system! Man, Bill, *things are going to happen!* It's nearly eleven million million calories, if it goes into heat—enough to turn one hundred and sixty-five thousand tons of ice into steam! It just can't stand all that energy in a lump—I'll wager my life on that."

"Eagerly we watched the tiny silvery button form in the still, little more than a speck of shining white metal, yet worth millions to any man in the world beyond the desert. With the greatest care, keeping it always in its atmosphere of hydrogen to prevent its oxidation, we sealed the radium in a slender quill-like tube of quartz—half a gram of our lives, half a gram of discord and dissension should it be carried back to the company, dissension which we had sworn to bring back, for which we were paid—on delivery. I wondered what the company would say when we returned without it.

"Balancing the world against the company's opinion, they balanced well, all too well, for the world would never believe our story.

"Old Croesus was calling me outside. Something must be brewing. The crystal monster out there in the swamp must be getting near the lode by now, and it probably showed it, for the rock near such a vein gets pretty well saturated with the radioactive substances from the pitchblende.

"Surely enough, the globe of purple haze had spread out on both sides, following the hidden vein, until it nearly encircled the entire crater. The clatter of the reeds was entirely drowned out now by the hum and crash of crystal from the Thing, though we could see a narrow ring of wanly glowing tapers for perhaps a hundred yards before the purple dome rose. The din was dreadful, now that we were out of the cave—shattered crystal crashing continually on all sides, while the metallic twang of rupturing facets and the taut hum of the straining mass had mounted to a crescendo screech. No longer was there any fairy tinkle of elfin bells! This was the forge of the old Norse dwarfs deep beneath Midgard, where the twisted craftsmen beat out for Thor a new hammer, of ice torn from the bodies of the Frost Giants, who roared their icy agony above the thrumming of the bellows and the beat of the forge. Hell's Garden was upholding its traditions heroically. It was too dark to see the flaming of the crystal beneath the cloaking mist, but we knew by the visible swelling of that purple cowl that it must be burning with fire greater by far than any we had seen before. The slow creep of the outer mist seemed to be accelerating a bit, and I knew that the roots of the Thing must be nearing the great vein of pitchblende that it was following around the crater.

"Nor were we disappointed, though the end came more suddenly than we had expected. At one instant the mist crept sluggishly to the tune of the slow crash of the growing crystal creature. Then, with such abruptness that the preceding din seemed like a sudden lull, it broke into a chaotic clamor that well-nigh deafened us. Twang and shattering crash followed each other with but the wink of an eye between, while the throb of growth that ran all through the great thing swept in an instant to a high-pitched wail like the scream

of a great bridge-cable in the fury of the cyclone. The hood of purple swelled upward and forward, hemming in the island on every side and sweeping up and over it in a sudden flood of thick light that blotted out all but the little area immediately about us—I with my lead robe but half removed. Tom holding the squat cube of lead which contained the precious quill of radium. Then it passed up from us, and we were in the great cavity beneath its shroud where the Thing of crystal lurked.

"I TOOK one look at the monster before me, then was out of my lead-woven robe and streaking up the face of the cliff to the observatory on its summit—Tom right at my heels with the little lead case. Past the cave mouth we clambered, and up to the six-foot platform at the very peak, then stopped, panting, cornered.

"For on all sides a mighty wall of crystal was rushing in upon us. Once, many years ago, I fled, a schoolboy, before the wall of water that poured down our little valley from a burst dam. It was like that, but where the wall of water had been tens of feet in height, this crystal barrier towered hundreds. It moved with that same effect of laboriousness that we had noticed before, but in truth it must have rushed down upon the island with the speed of a racing auto, all its precipitous face alive with jutting, darting lances of crystal that poured multicolored flame from every facet. Over the limp ranks of the fallen reeds it rushed, and grated on the rocky beach, swallowed in an instant our pitiful pile of food and rough huts, then was swarming up the face of the central cone, the summit of the wall tilting back to form a mighty peaked ridge that surrounded the island and shot in a frenzy of growth hundreds of feet above our heads. Truly that mother lode must have been rich in the food of the gods!

"As it reached the cavern of the laboratory and enveloped it, there was a hiss of released fires, and the monster seemed to wince as the caustic chemicals it had freed bit into its body. There was surely some effect, for the face of the wave was rising more slowly and stopping, half a dozen feet below our little summit of safety. Yet everywhere else the peak of the Thing was rocketing skyward in a chaotic frenzy, great lances and sabre-blades of flashing crystal thrusting in slow curves from rupturing facets, out and up to the hidden heavens from which this creature of silica had come. Unholy, awful growth it was, prism and pyramid and many-faceted shaft leaping in mad disorder from the great hulk beneath, while raw color played and flickered through their many-angled forms, colors that told of the enormous strain of growth within, and auroras of blue and scarlet fire poured in ranging streamers from every knife-edge and pinnacle. Up and up it soared in horrid din, hemming us as in a mighty cone of light, at whose vortex we stood. Above, the streamers of flame laced and mingled in a great Armageddon of color, dripping in huge gouts and sheets of fire about us and over us, filling us with the awful energy of the Thing. Fire flowed in my racing pulse, fire gripped my burning brain and surged through my twitching nerves. I was bathed in a halo of fire that leapt and crackled from every pore and burned in great ribbons that spun from my finger-tips. The lead case that Tom clutched to his breast burned vivid white with the mingling energy that filled the atmosphere and vainly strove to pierce its wall, to the feast hidden within the shielding lead.

"And now in the peak above a great ravine was opening, widening, splitting slowly downward into the crystal mass, as if a huge invisible blade were forcing down and down into the body of the Thing. Sheer and smooth the great walls rose, colorless and transparent, and through them I gazed into the troubled heart of the Thing of crystal, where mighty rivers of light and life were surging to the surface. And now, high above all else, there swam at its upper limit a great hexagonal column of green and golden flame, thrusting slowly up from the vitals of the Thing beneath. Smooth, unbroken it soared, and with its rising, the clamor of growth lulled and died, and far off over the distant desert I heard the wail of a questing kite. From its summit, now, a new form was budding, swelling swiftly to unbroken vastness, unangled, unfaceted—a giant sphere of purple flame that pulsed and throbbed with life—the life of the Thing. A hundred feet through its heart it was, clear as the crystal beneath it, yet vibrant with flame of lilac and hyacinth and lavender, deepening to the rich purple of Tyre-purple of emperors. Slowly it pulsed, as a thing breathing, and with each throb swelled mightier and more beautiful. And now little vortices, little cones of crystal clearness were opening and spinning all over its surface—clear as the rill springing fresh from the glacier's foot—little clear trumpets of life in the purple glory, like tiny ears, *like tiny eyes*. A feeling of great presence swept through me, and I knew that through its many little crystal eyes the Thing was watching us—the mighty sphere of living violet that was the mind of the crystal creature.

"From the column's crest poured a broad blade of crystal, straight from the foot of the great sphere between the towering crystal walls to our very feet, spanning the gap with a rainbow arch of opalescence, flung by the Frost Giants between Asgard of the Aesir and Midgard of men. And now the voice of the crystal had risen again, surging in dreamy billows of dull crooning through all that frozen mass. And now the mighty sphere of light was gliding slowly down the crystal path toward us—a monarch advancing to fix the doom of an insect race. But in my ears rang a cry of defiance, and like a warrior chieftain striding to meet the foe, Tom was leaping up that smooth road of crystal, up to meet the advancing sphere that was sweeping down like a Juggernaut upon us. How his feet clung to the crystal I cannot tell, except that his first great leap gave him the speed whose momentum bore him on. Lit with the flames that poured in great streamers from his glowing form, he dashed madly upward, in his lifted hand a tiny tube of quartz that blazed with a blinding white light, such as I had never seen. Then his mad rush slowed and stopped, and at the peak of his breathless course he hung motionless between the fathomless walls of crystal, his arm flew back, and the tiny oblong of white fire was hurtling straight to the purple heart of the glorious sphere. Then, like a lifeless rag, drained like the reeds of his every bit of energy, he was gliding limp down the crystal causeway.

"As the mind of the crystal Thing saw that speck of white fury darting to meet it, it paused a moment in wonder and puzzlement, then opened to envelop it. I had an instant vision of great fathomless depths of undulant opalescence, where mighty flaming streamers of life boiled and cascaded madly, then the purple glory closed greedily about the tiny tube with its radium

messenger of unearthly feasting. The beat of sound was checked in a crushing hush that clutched at my throat and mind. Then it burst forth in awful frenzy, sweeping to a crescendo shriek of winds that rose to silence. About me poured the torrents of streaming flame, about me hurtled blade on blade of straining crystal, leaping and bursting into tangled chaotic growth, even as they shot from the shattered facets of the Thing. In a way, it was like the playing of Man-made lightning that I have seen in the laboratories of the Company, the fury of Nature's power unleashed and coursing in unchecked freedom, madly, blindly, to destruction. Yet here the flame-tongues that leapt and mazed were of crystal, hard and keen-edged, like slender warring blades that met and battled and fell in a hail of tiny gems about me, beating on my head and arms and slashing them until the blood spurted in little fountains from the tortured flesh. I cannot really tell of that moment, less than a second of life—it is beyond the power of mind and tongue to reproduce. Yet in my mind it is graven in undying imagery, burned in fiery panorama into my very soul. As my breath hissed in, the mighty sphere of Life hung dazed above the crystal maelstrom, and the body of him, who had brought it destruction, sped halfway to my feet down the rainbow incline. And as the breath went from me, emptiness gaped around me and the stars shone free upon the distant sands of the desert and the far-off mountain walls, and upon the flashing turmoil of light about the foot of the cone, down whose rocky sides little rivulets of tinkling crystal were trickling.

"The happening is beyond my mind. I heard no crash of collapse, nothing to tell of the death of the crystal Thing. Perhaps its sudden sound was above the power of ears to hear. One moment it was there, filled with horrid life and growth, and then—it was gone, and beneath the crater's floor twinkled in the starlight like the fabulous Valley of Diamonds in the legend of Sinbad, crystalline death.

"I found Tom, half buried in crystal debris on the ledge before the laboratory cave. He was horribly torn by the jagged prisms beneath and upon him, his bones splintered by the fall, but yet alive. He smiled up at me, his eyes calling me down beside him. Faintly the words came, panted out with each laboring breath of agony.

"Bill, remember old Prof. Blakeslee? Remember—he said there might be life somewhere, life that wasn't just a disease of impure carbon? He said maybe, somewhere, there was life in which silicon took the place of carbon—same series in the periodic table, and all that.' And then—I heard him once—he said to himself, 'But try and find it. Try and find it, Bill. Just you try. Joke, isn't it? Joke!'"

"That was all.

"He lies, king of the Valley of Diamonds, in the topmost cave, where his precious telescope had been, where only twisted metal marks the spot where together we watched the swelling of the nova in Pegasus. All about, rising from the dead swamp to the flanks of the guardian range and banked halfway up the central cone and on every ledge to the topmost summit, lies a crystal carpet, throwing back the fire of the sun and stars in a prismatic glory of leaping light. And far beneath are the labyrinthine tunnels of the pitchblende lode, gutted in part by the crystal monster from the stars, but still bearing



a fortune for him who can find it. I will not point the way. The crater is Tom's, his monument to death, and Man owes him its sanctuary. Some day it must needs be found again, some day this mad story will be accepted as truth and the name of Tom Gillian honored by his race, the bickering cattle for whom he died. Perhaps there will be decency enough extant in that future day to hold his tomb inviolate, but I fear not, for greed and reverence are incompatible in Man.

"Arab slavers found me, lost and raving in the desert, and made me brother by blood to them. I had crystals in my pockets, in place of food, crystals such as no man had ever seen, harder than diamond and of greater fire, but brittle. I have them still, a double handful and more. In the dark they blaze with the fire of radium that is in them, but they must be hidden away in lead lest their cold fire burn. The slavers believed my story, and in their tales of the camp-fire there is that of the world-devouring monster whose grave is abhorred of Mecca and the Faith.

"I am—outcast. The company dropped me like a live coal. I had no radium, no records, nothing, and my story was mad, fantastic. They chose their facts well, in their minds. We went out, two men with a mission,

a duty. I returned alone, with slavers and a few crystals of some new, unimportant silicate. Perhaps we had fought over the crystals, perhaps over some slave. Perhaps there were beasts or fever, and I deserted him. Their minds are made up.

"I have tried to bury those memories, but at night they live again—the death rattle of the reeds, that swelling tinkle of fairy bells, the crystal star-Thing and its mighty destruction—all live in my haunted brain. I told Blakeslee, eventually. He did not even speak, just turned away, as if I were a snake. I came here, finally, where no one knew me, and yesterday I saw your sign. I didn't want to leave anything untried, you see.

"But you're human. You'll be like all the rest. It can't fail, I suppose. Maybe you'll have me locked up. I haven't tried that; it might bring peace—of a sort. There isn't anything else left, unless I go back to those slavers and accept Islam. Not that religion matters. Christians have been no better than the rest—all are only human. And to cap the climax, the company is placing a branch here next month, in the old Western Electric plant. There isn't much left, is there? I can't even arrange a decent suicide—a scientist's suicide. It's funny!"

THE END.

## Awlo of Ulm

### By Capt. S. P. Meek, U. S. A.

(Continued from page 509)

left and another serious attack would settle matters. Olua gave another argument.

"You do not know the power of Kau," he said. "They have tried to conquer you quickly so far but now I think they will settle down to do it slowly. It is only a matter of time until they will construct a new power house or at least a power unit sufficient to power their fighting suits and when they do, the battle is over. I can make suits for our men but they would be outnumbered by a thousand to one. No, Courtney Sibama, what Moka says is true. You and our Sibimi must fly to safety. For this reason, I brought you your ship."

Thus reinforced, Moka returned to the attack.

"Ame has not yet fallen to the Mena," he said, "and there you and the Sibimi will find refuge and can build up again the empire of Ulm. We here are few and worthless, but the hopes of a mighty people are bound up in you. It may even be that when the Mena are defeated that you can lead a rescue party here for us."

"Wait a minute," I cried. His voice gave me an idea. I had forgotten the possibilities of my electronic vibration adjuster. Could I win my way to that, I could make my Fokker large enough to carry the entire population of Ulm, Ame and Kaulani. As the possibilities of the plan became clear, I gave a shout of joy.

"We will go," I exclaimed. "We will go, but we will return and carry you all to Ame."

In a few words I outlined my plan and Moka, Hama and Olua enthusiastically agreed to it. I don't think that any of the three expected me to succeed but the fact that Awlo and I would be safe was the thing that was uppermost in their loyal minds. In a few minutes we were on the roof and I was examining the Fokker prior to taking off. Satisfied with my inspection, Awlo and I

went the rounds of our subjects to say farewell. Our plan had been told to them and man after man, the brave fellows thrust forward their gun butts for me to touch and knelt at Awlo's feet. To each of them we gave a hearty hand clasp and then, with only the three Alii in attendance, we ascended to the roof to take our departure. At the last moment I suggested that Olua accompany me to help me with the adjuster but he objected on the grounds that his knowledge would be needed to ward off the next attack. Moka dropped on one knee with the tears suspiciously near overflowing in his blue eyes.

"Farewell, my lord; farewell, my lady," he said. "It is the best end to die bravely for those we love."

"Die, nothing!" I exclaimed. "I'll be back here in five hours at the outside to take you all to Ame and safety."

"If it be so written," he replied, "but if not, remember ever, my friends, that Ulm was loyal to the last."

Awlo was sobbing openly and the tears were coming into my own eyes, so I brusquely put my princess into the plane and took the controls. Olua spun the propeller and the little craft soared into the air and at her best speed flew to the west toward the Kau mountains.

In two hours we were over the mountains and I was searching for my adjuster. At last I saw it and on a long slope we glided down toward it. We were within a hundred yards of the ground when the sun suddenly darkened and a terrific gust of wind turned the ship completely over. I strove to right it, but we were too close to the ground and in the semi-darkness, we crashed. I staggered to my feet and found that neither of us had been more than badly shaken by the fall.

As we climbed free from the wreck, the wind nearly



carried us from the ground while crashes which shook the earth came from all around us. The sun was still partially obscured and I looked up and saw a marvel. Through the air were flying rocks the size of mountains, some of them apparently miles in diameter. They were flying toward the east and I realized that some of them must be falling on or near Kaulani.

"The kahumas! The giants!" cried Awlo.

"Kahumas, nothing!" I replied. "I don't know what it is, but it is no witchcraft."

As I spoke, another blast of wind came and again the sun was darkened. When it cleared, more of the huge masses of rock were flying through the air. One boulder, which must have weighed a million tons, fell not over two miles from us.

"Quick, Awlo!" I gasped. "Come with me!"

I grasped her hand and we raced for the adjuster. The only defence against such masses of rock was to increase our size until they were small in comparison to our bulk. We entered the machine and I turned the speed control to maximum, at the same time setting an automatic stop I had put on my new model, which would halt our increase when I arrived at my normal six feet. My hand reached for the increasing switch when a fresh cloud of rock masses came hurtling through the air, this time falling to the west of us. One of them struck the mountain above us and started a slide. I looked up and saw thousands of tons of rock rushing madly toward us. Awlo gave a cry of despair and fear but before they reached us, my hand closed on the switch and I pulled downward with all my strength.

I stepped from the adjuster and faced with clenched fists a grizzled old prospector, who lay on the ground where he had been thrown by the adjuster, as it had grown almost instantaneously to its original size.

"What do you mean by digging here and killing my friends?" I demanded hotly. "This is private property."

"Taint so on the map," he retorted as he rose. "It's a public domain and I reckon a man can prospect where he pleases. Where in hell did you come from?"

Without bothering to answer him, I hastily pulled the adjuster to one side. Under where it stood was piled dirt that that wretched fool had thrown and the weight of the adjuster had packed it smooth. Ulm, Ame, Kau; all were gone; buried under what was to them miles on miles of rock.

"Where did you come from?" demanded the prospector again as he dusted off his knees. "You weren't here a minute ago!"

"I came from a better land than you'll ever see," I replied grimly. "Hand me your shovel for a moment."

I took his tool and reached in and changed the speed of the adjuster to slow and closed the reducing switch. Sadly I watched it as it shrunk down to nothing and vanished from our sight. When it disappeared, I turned to Awlo, ignoring for the moment the ancient prospector who had watched the proceedings with dropping jaw and eyes as big as saucers.

"Farewell, Awlo, Sibimi of Ulm," I said solemnly. "My dear, you have lost forever your royal title but you have gained another fully as honorable, if it is slightly less exclusive."

"What do you mean, Courtney?" she asked.

"I mean that through the action of God and this ignorant agent of his, the Empire of Ulm had ceased to exist. You have ceased to be Awlo, Sibimi of Ulm, and will henceforth have to content yourself with being Mrs. Courtney Edwards, citizen of the United States of America."

THE END.

## What Do You Know?

**R**EADERS of AMAZING STORIES have frequently commented upon the fact that there is more actual knowledge to be gained through reading its pages than from many a text-book. Moreover, most of the stories are written in a popular vein, making it possible for anyone to grasp important facts.

The questions which we give below are all answered on the pages as listed at the end of the questions. Please see if you can answer the questions without looking for the answer, and see how well you check up on your general knowledge of science.

1. What might be associated with Lord Kelvin (Sir William Thompson)? (See page 515.)
2. What might be associated with the great Swedish chemist Arrhenius? (See pages 515-517.)
3. What could you term the depression or craterlike formation due to a fallen meteorite? (See page 516.)
4. How does size affect the relation of the surface area of a solid to its mass? (See page 517.)
5. What catalyst is available for the fixation of nitrogen by the Haber process? (See page 518.)
6. What is one of the principal features of the Haber process for the fixation of atmospheric nitrogen? (See page 518.)
7. How can you produce the images of low forms of life in a chemical solution? (See page 521.)
8. To what can you refer a point in the solar system and how can you express it? (See page 542.)
9. If power were drawn from cosmic radiations would it be perpetual motion? (See page 546.)
10. What possible atomic change could be made to give an accumulator? (See page 548.)
11. Can intra-atomic energy be used? (See page 548.)
12. What would be the effect of deceleration on a body? (See page 530.)
13. About what is the lunar force of gravity compared to that of the earth? (See page 531.)
14. When an airplane "zooms" what does it do? (See page 540.)

# The Lunar Chrysalis

By Raymond Gallun

*Author of "Atomic Fire"*

*THE last few years seem to have brought us some unaccountable seasonal changes. What if the changes should become more marked, and very much more serious, even to the point of injuring us? What would humanity do then? Such a calamity is, of course, not likely to happen for many thousands of years, but it is an interesting subject for speculation. One very marvelous solution—providing the method can be discovered, or invented—is offered by Mr. Gallun in this excellently written story of scientific interest.*

Illustrated by MOREY

IT would be difficult for anyone to review the history of the tremendous events of the past fifty years without being impressed by the triviality of the causes which govern not merely the history of the earth but that of the universe. If a little device enclosed in a box occupying not more than a cubic foot of space had not failed to operate, it is probable that human beings would never have evolved upon this planet. Certainly they would never have become the dominant form of life here. If it had not been for the innocent meddlesomeness of a certain individual, the wonderful transformations which have taken place in our civilization and knowledge would almost certainly have been long delayed.

The story of the Lunar Chrysalis has been told many times. But some of my experiences, which I am recounting now, are new to the world. On the evening of August 29th, 1951, I was aboard the first and last great lunar rocket, *Black Meteor*, which was rising rapidly above an Arizona desert, headed for the moon. My only companion was Professor George Paxton, noted astronomer and inventor, who, during my four years at college, had become a very dear friend of mine. Though he was past sixty and had spent most of his life studying things far above the comprehension of the average person, his youthful enthusiasm and energy made him no mean companion for me, who was then a lad of twenty-two.

The journey to the earth's satellite was a complete success. Except when we were accelerating or decelerating, we traveled with a fair degree of comfort. However, the heat from the rocket motors and the

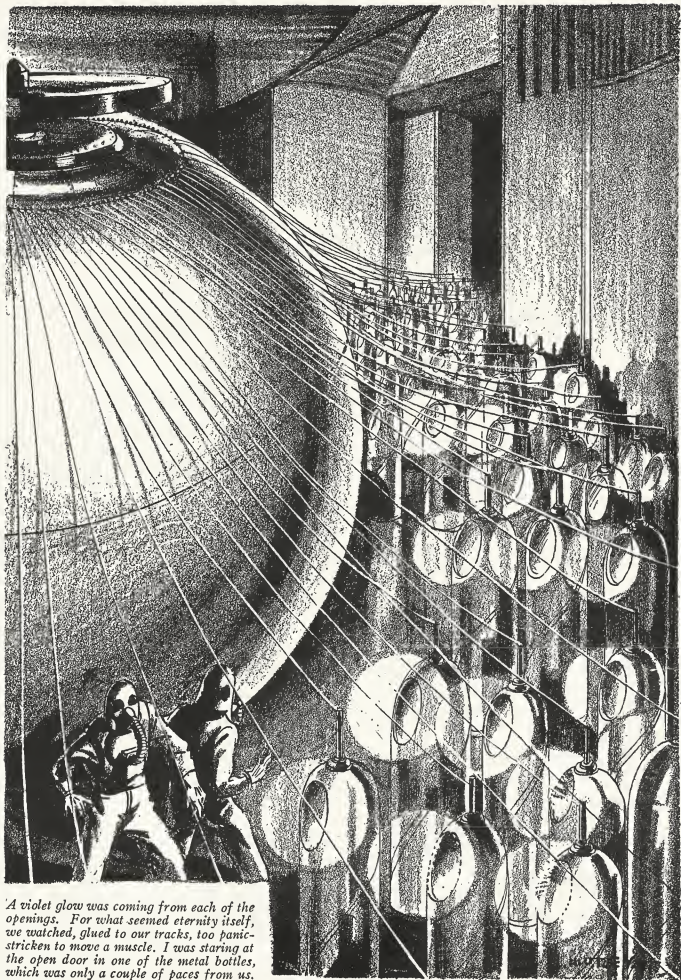
constant vibration, together with the smell of ozone, were not particularly pleasant.

So accurately had our craft been aimed, that during most of the trip we scarcely needed to touch the controls at all.

The majority of my time was spent examining the cryptic, buzzing machinery of the strange vehicle in which I rode, and enjoying with Professor Paxton the wonders of space—the brilliant stars and the great black cavities of emptiness between them, the huge, blinding sun with its flaming corona, the shrinking earth, and finally, the mysterious moon, which hour by hour grew larger. Seen from our native planet, that moon was a beautiful, romantic sight, but when viewed at closer range its rough and jagged details stood out, and gave it a weird and terrifying aspect, which sent little shivers up and down my back. Yet it was a pleasant terror. I never regretted my decision to be one of the first men to visit Luna.

We headed straight for the crater Tycho, for here Professor Paxton believed that there were the remains of an ancient Lunar civilization.

The last few hours of our flight were indeed an exciting time. Both of us were in the control room which was located amidships. Television panels all about the walls gave us views of surrounding space in all directions. Anxiously we were watching one big panel. In it was pictured the glowing globe of the moon, which grew ever larger and larger. The rocket motors had been stopped for many hours, but still, urged on by the gravitational force of Luna, we were hurtling along at a constantly increasing speed.



*A violet glow was coming from each of the openings. For what seemed eternity itself, we watched, glued to our tracks, too panic-stricken to move a muscle. I was staring at the open door in one of the metal bottles, which was only a couple of paces from us.*

Professor Paxton was glancing nervously from speed indicator to gravity detector, and from gravity detector to chronometer. Presently he turned a series of six big wheels one after another. Then he shifted a little, silvery lever from a vertical to a horizontal position. I felt the whole craft suddenly rotate in an alarming fashion, but it was all over in an instant. The flat base of the rocket was now toward the moon instead of its pointed nose. It was time to apply the brakes, and the twelve stern rocket nozzles were ready to perform this duty.

Professor Paxton shifted another lever—this time an immense black one. A thunderous roaring, accompanied by a tooth-cracking vibration, set in; then an awful feeling of weight came to us. The jets of vapor ejected toward the moon were checking our fall.

For an hour our discomfort continued, during which time we could do nothing but lie on the soft swinging couches hanging along opposite walls of the narrow compartment. Even breathing was painful. The sternward view-panel showed the moon creeping gradually upward to meet us.

The uncomfortable feeling of heaviness caused by the rapid deceleration gradually decreased and then disappeared altogether. We were hanging motionless ten miles above the satellite, supported there by darting jets of flame coming from the rocket motors. Whirling gyroscopes were keeping the *Black Meteor* balanced in a vertical position.

The view-panel told us that directly below us was Tycho. It was dawn on that part of the lunar surface, and in consequence the sun was close to the horizon. Tycho's encircling ring of mountains cast an ebony shadow across its floor and made it look like a great lake of ink, or like some tremendous maw opened to swallow us.

My companion turned down the rocket motors a little, and we began to sink. Down, down we went. Now we were on the level with the mountain peaks, now we were in their shadow. Presently we landed with a slight jar on the surface of the moon!

Professor Paxton busied himself with the controls for a few seconds, and the roar of the rockets fell silent. The screeching hum of the gyroscopes died out a moment later.

Hurriedly we climbed into our space armor. The heavy door, which resembled the breech of a big cannon, was opened, a ladder of steel cordage was let down and the professor, carrying the American flag, descended. I followed him closely.

Reverently we took possession of the moon in the name of our Mother Country and we planted the flag in the gray sand. Not until then did we begin to take stock of our surroundings. We were quite close to the western mountains; the sun was shining on them. They loomed upward, vast and majestic, as though they were meant to be the pillars of the sky. The rock from which they were formed was of varied, though somewhat subdued shades. Pale, ashy-gray predominated. Here and there were patches which, under the strong glare of the sun, were so nearly white that they looked like snow. There were a few scattered areas of black and dark red. The mountains were seamed with deep ridges in which shadows still lingered. Above the great range was the sky—dead black, except where the dazzling stars shone. I do not think that there was anything

about the moon more terrifying and more conducive to utter loneliness than that horrible dead firmament. It was a fitting background for the complete desolation of the lunar landscape.

HIGH above our heads was a gray-green crescent shining calmly among the stars. The sight of it, during the journey, had frequently made me feel, that after all, my adventure was only a dream or an hallucination. Now I wondered again how I could be way out here on this world of emptiness looking up at the warm, friendly earth that was my home. I could see the eastern edge of North America, partially mist-veiled. It seemed too utterly fantastic to be true!

The sunlight reflected from the mountains lit up the floor of the crater dimly. Except for a few ridges and irregularities, it was very level. At the foot of the enclosing rampart many boulders were strewn. All about the ground was covered with what appeared to be very fine, gray sand. Far to the east we could see Tycho's farther wall, diminished in size, but perfectly clear-cut. The base of that wall was in deep shadow. At our backs, rearing up like a squat, thick tower, was the *Black Meteor*.

"So this is Luna," I said. "Rather impressive at close range, but so far she hasn't shown us any real surprises. We knew all about this before we came."

Professor Paxton scooped up a little handful of sand. "Don't be in such a hurry to be disappointed, son," he said. "I'll wager that there is something in this little bit of soil that will interest you immensely. Let's look."

We examined the sand together. My companion let most of the loose dust slip through the fingers of his space gloves. The little remaining dust had a few small, frost-like crystals mixed with it.

"Congealed carbon dioxide," said the professor. "As was predicted, the moon now has a very rare atmosphere made up largely of that gas. It gets pretty cold here at night—probably not so far above absolute zero. In consequence, some of the atmosphere freezes and forms a sort of hoar frost, which melts again when the sun shines."

"Very interesting," I said, "but you told me all that when you lectured at the University of Wisconsin. Come on, you were talking about something really interesting." As a matter of fact I was bluffing my *Nil admirari* attitude. As though anybody twenty-two years old and in perfect health could spend his first five minutes in Tycho and not be fascinated by everything he saw!

"All right, Jerry my boy," said the professor. "Here is the first mild surprise." He shook the remainder of the dust from his hand and then held out a little triangular piece of transparent substance. It was flat on both sides and looked exactly like a bit of broken window pane.

I stared at the thing for a second. "Well, I'll be hanged," I exploded. "You're not by any chance trying to prove that this desolate old wreck of a world was once inhabited, are you?"

Paxton shook his head gravely. "No, facts are what we are after—just facts. Remember, we're scientists."

I had knelt down in the sand and was scratching around with all the diligence of an industrious squirrel. After a few moments I unearthed another much larger piece of glass. I held it out to Paxton. "Here is an-



other item for your bag of facts, professor," I said. "Better pack it carefully away with moth balls or salt it down or something."

"None of your sass, stripling," replied my companion good-naturedly. He was on his knees beside me now. Presently he let loose with a wild war whoop and leaped to his feet with such suddenness that he went fully three yards into the air. You know, of course, that the lunar force of gravity is only one-sixth that of the earth. When he was back on solid ground, he cried, "Look at this, Jerry, and then try to deny that the moon was once the abode of life!"

The thing he was holding toward me was a small piece of what looked like very old wood. I took it from him and scrutinized it carefully for a moment. It was cylindrical, and had a pithy central core with a hard shell around it. From its mid-portion a sort of twisted tendril branched out. I realized immediately that the thing might have been buried there in the sand for many ages, for on the waterless, airless moon, decay is necessarily a very slow process.

"Seems to be the goods, professor," I said.

The latter was now all excited activity. He was pointing to a long shallow ditch which ran a perfectly straight course toward the center of the crater's floor and disappeared from view in the deep shadows. Its nearest point was about twenty yards from us. "There is other evidence in favor of my theory—an irrigation trench, certainly."

We went over to the thing and found out that it was artificially constructed. It was uniformly about ten feet across, and we could see that its bottom was made of a black stone-like substance which showed no indication of any crevices where it may have been jointed together.

We saw several long thin rods of this same black material stuck vertically in the ground. Some of them were as much as ten feet high, and had little round discs at their tops. Others were bent over and warped or broken. Paxton noticed that some of these rods were fixed so as to form the corners of squares—evidently there was some system to their arrangement. Then he began to scoop in the sand with a tiny trench spade, which was a part of the equipment we carried. I assisted him. We freed a couple of square yards of ground of the dust that had covered it. That fine powder was fairly loaded with fragments of glass and pieces of the black rods together with stalks of an ancient vegetation.

"What do you make of it all, prof.?" I asked.

"Quite clear, I think, son," he replied. "When this world was getting old, and its air and water were almost gone, the clever Lunarians conceived the idea of making a big hot-bed or greenhouse out of this crater floor. They set these black posts all over and put a roof of quartz glass on top of them. The roof was probably airtight, and prevented the evaporation of the precious water into space. Then, too, it imprisoned atmosphere enough to make possible the growing of plants. It also protected them from cold during the long nights."

"Good reasoning, prof., but where did these hypothetical Lunarians of yours live?" I asked.

"Well, I'm not absolutely sure, but I think that they lived deep underground. As the air and water slowly disappeared, and the climate became rigorous, the intelligent inhabitants would naturally retire to the pro-

tection of buried caverns. The entrance to these caverns should be somewhere in the neighborhood. We will certainly find it eventually."

We spent the next few hours wandering about the western portion of the crater's floor. We went up along the foot of the mountain range and out toward the center of the great bowl-like depression. Everywhere was the wreckage of the lunar irrigation system. Slowly the sun crept higher and began to light up the ground all about us.

After a time we made our way back to the *Black Meteor*. Paxton prepared an excellent meal of ham and eggs, which we both enjoyed immensely.

Then I climbed the long spiral stairway to the pinnacle of the rocket a hundred and fifty feet above the ground. Here was a small chamber roofed with a dome made of a tough, unbreakable, and perfectly transparent substance, which had been specially prepared for the purpose. In the center of the room was a telescope. I took my place at the eyepiece, and began to scrutinize carefully Tycho's walled plain which spread far to the east. Slowly I drew the objective lens along the crater's northern wall. Sand, rocks, and boulders in the far distance became like things in the immediate foreground. Everything was as clear as crystal, for there was no fog or haze to obstruct my view.

Presently something odd caught my eye. It was a big, black kopje or little hill of very peculiar form, which lay some little distance out in the valley. The sun was already shining on it, and I could see that it was highly polished, judging from the highlights that flashed from it. It was roughly square, and on each of its four sides, or rather on each of the three that I could see, was carved the head of some dreadful lunar monster. The mouths of the heads were widely distended. The queer block of black stone was crowned by a thin needle-like spire that rose all of two hundred feet above the rest of the structure.

I searched Tycho's floor with the telescope, rather hurriedly I admit, for the next five minutes or so; but I saw nothing more that was of interest. I came back to the rock of the Four Faces, and then called Professor Paxton, who was down below, packing away the specimens and relics he had collected.

When he had stared into the eyepiece for thirty seconds, he was all aflutter. "Gosh, Jerry, this is something! Get into your space armor and then let's pick up some supplies and be on our way quick!"

Well, you can guess that I didn't waste much time in following Paxton's suggestion, and for all his years he wasn't slow either. We saw that the air-purifiers connected with our oxygen helmets were ready for twelve days of service without further attention, packed up some concentrated rations, a supply of water, our space-tent, a camera and various other things needed for exploration. Then we started out.

**I** BELIEVE that it will be well for me to give a brief description of our space-tent here, for this piece of equipment was certainly sufficiently novel. It was a tiny light-weight shelter, made of a cold-resisting, rubber-like material supported on a metal framework. It was absolutely airtight and its walls were built to resist normal earthly atmospheric pressure. Eating and drinking were impossible, of course, when we were incased in our space-armor, and so when mealtime came



around, while we were away from the rocket, it was necessary for us to put up our tent and remove our heavy impedimenta. That tent looked mighty serviceable even though we never got a chance to use it. Why, a fellow could even enjoy a quiet smoke inside of it! It rolled up into a compact little bundle that was easy to carry.

The distance between the *Black Meteor* and the rock of the Four Faces was about seven miles. We made it in good time, moving at a dog trot most of the way. But now and then we leaped along covering twenty-five or thirty feet at each bound. Considering that things of equal mass weigh six times as much on the earth as they do on the moon, the weight of each of us, including our space-armor and equipment, represented about fifty-five pounds.

Only once we paused, and then for just a minute or two. The sun was already shining on a portion of the crater's floor. In a little depression, or hollow in the glowing sand, we found a cluster of tiny lichen-like plants. They were gray-green in color. Their leaf-like whorls, which clung close to the ground, seemed perfectly dry, but still we knew by their fresh appearance that they were living. Somewhere in that deep lunar valley there was still a trace of water.

"Plenty of time to study present-day lunar plants after we have visited the Four Faces," said Paxton.

Presently we were climbing the gentle slope of the knoll, on which was perched the queer relic of the civilization of the ancient Moon Men. I felt oddly like a poor victim being led to the flaming maw of some heathen idol.

We circled the structure so that we might see all sides of it. It was about fifty feet square and, neglecting the spire, about equally high. The four heads with their gaping mouths were all identical. They represented the head of a creature which seemed to be part feline and part reptile. The fanged jaws, the wicked, slanting eyes, and the little triangular ears were catlike; but the fine scales that covered the forehead and neck were unquestionably reptilian.

We found that the mouth of each creature was a door which led into the interior of the rock. With a feeling that was very close to awe, we entered one of the weird portals. The central chamber was circular, and except for a sort of ledge or walk running all around its walls it was floorless. In place of the floor, there was a great circular pit. Eagerly we peered over the railing which surrounded the hole. From far below a faint radiance seeped upward, lighting the walls of the immense excavation dimly. We could see that there was a road or runway spiralling down around the sides of the pit. It terminated on the side of the well opposite us.

"The plot thickens, professor, but the Fates point the way toward the solution of this mystery. Come," I said.

We walked around to the other side of the pit to a place where the roadway began, and started down it. A layer of fine dust covered the runway. The fact that it was perfectly smooth and undisturbed heightened our belief that it had not been used for many ages.

Every now and then, as we spiralled downward, we came opposite a large circular door in the walls of the well. Each was closed by a big metal portal.

"Well, Jerry, here's our moon city. Just as I expected—entirely under the ground. The doors probably

lead into the streets. We'll blast through just as soon as we can. Everything should be perfectly intact—the buildings, the machinery, even the dead Lunarians themselves. Talk about digging up Maya cities and Pharaoh's tombs! Mighty little stuff compared to this!"

At last, after a long climb, we came to the bottom of the well. Like the walls, it was covered with a black cement. At some time there must have been a rather violent moonquake in the vicinity, for the floor of the pit was veined with many deep cracks. At its center there was a trap door which had probably been closed at one time, but which had been burst open by the quake. Part of its frame had broken away, and it dangled down on its hinges into whatever chamber or room lay below. That room was brilliantly illuminated, seemingly by some artificial means. Incautiously, the professor and I knelt down beside the open trap door. We took just one look below, and then everything under us gave way. Amid fragments of broken stone we both tumbled to the sand-covered floor fifty feet below. The distance was the equivalent of only about eight feet on earth; in consequence neither of us sustained any injury.

Paxton looked ruefully up at the big gaping hole in the ceiling. "I hope this room has another exit, Jerry, because if it hasn't, we're going to have to work pretty hard to get out of here. Let's look about a bit first, though."

THE chamber in which we found ourselves was certainly a huge one. We were standing near the northern wall, and could get an excellent view of it. It was circular and must have been at least two hundred yards in diameter. It was roofed by an immense, white, stone rotunda, at the center of which was a big crystal globe, which gave a brilliant but not dazzling light.

Almost the entire floor space was occupied by a weird outlay of apparatus, the purpose of which we were then unable to determine. In the middle of the pavement, a black hemisphere bulged up at least forty feet. On its top was poised a heavy metal disc, which looked like a huge horizontal fly-wheel. From this machine scores of small pipes and heavy cables branched out, after the fashion of the radial strands of a spider's web. Each of the pipes was connected with the tops of a long row of queer torpedo-shaped bottles of tarnished metal. These bottles were little taller than a man. Each had what appeared to be a little circular door in one side of it, near the top. I estimated that there were about ten thousand of these bottles in the room.

Everything in the vault was covered with a layer of fine dust, which showed plainly that no living creature had invaded the place for a long time. Unfortunately Paxton's hoped-for "other exit" was nowhere in evidence. The principal task of the moment was to find some means of escape from the trap we had so awkwardly fallen into. Hence we didn't have much time to devote to more interesting things. Since I was younger and more agile, the job was left mostly to me, and a most disgusting job it was! First I threw aside every piece of impedimenta I didn't need, and going back a ways from beneath the hole in the ceiling I got a running start and tried to jump for it. Well, I didn't go up much more than half way. I tried again several times with no better results. Then I took a long steel cord from my pack and made a lasso of it. Again and

again I hurled the noose up through the opening in the hope that it would get caught on something and provide a means of escape, but no such luck.

There were three circular doors, similar to those along the spiral runway, set in the walls of the chamber. It was the professor's suggestion that we try to blast through one of these, and seek a way to freedom in that direction. We were carrying a small quantity of corlissite with us. Well, we did attack one of the doors, but after a long interval of boring with the small but effective drills we carried, and frequent blasts, we gave up. Our explosive was exhausted. The metal of the door was the toughest I had ever seen and the stone around the frame was only a trifle weaker.

Only one more chance remained. We would have to collect everything in the room that we could move and make a pile of it under the opening in the roof. Then perhaps we could scramble up and regain the runway. But there wasn't any hurry about it. It would be twelve earthly days before the Lunar sunset. We had food and water for that length of time, and our air-purifiers could be relied upon to supply us with oxygen. Right now we were badly in need of sleep. For two days before we landed on the moon, we hadn't slept, nor had we indulged in a nap since.

Each of us kicked a little pile of sand together for himself and lay down in it.

Just before I began to doze, a thought struck me: "Funny, how that big light up there can burn so brilliantly when it hasn't had any attention for goodness knows how long," I said.

"Yes, it does seem queer to us, but you must remember that at the time they became extinct the Lunarians were scientifically probably far in advance of present-day human knowledge," replied my companion. "The functioning of their machines must have been almost completely automatic. They were so perfect that they needed practically no attention. Doubtless there are many Lunarian machines still in existence which need only the touch of some living hand to set them to work."

In a minute we must have both been sound asleep.

I awoke at last with a feeling that I had just had a wild nightmare. What my imaginary adventure had been, I had even then forgotten; but I still had a vague sense of terror. The last words of Professor Paxton, spoken just before we had gone to sleep, somehow haunted me. What if the big, engine-like device in the room was still in a condition to operate? Supposing I should attempt to start it? The idea captured my fancy immediately. I glanced toward the still slumbering Paxton. Needn't bother to awaken him.

I proceeded down an aisle between two rows of metal gas tanks toward the center of the room, where the machine squatted. I walked around the hemispherical thing once to see just what it was like. I had never ventured that close to it before, for I had been too much occupied with other things. There was no way to determine the principle of the enigmatic mechanism, for its working parts were all covered. Only the great disc at its top, and the hundreds of cables which radiated out in all directions, showed. A little stairway ran up one side of the hemisphere to a small platform. With the zest of the explorer hot within me, I climbed it.

Set in the side of the machine was a black box about ten inches square. On top of it was a small lever which swung in a plane parallel to the upper surface of the

box. Engraved in the metal along the arc in which the tip of the lever would evidently move, was a series of spaced marks, like the figures on any kind of meter or dial.

The lever was the only bit of ornamentation, which the colossal mechanism boasted. It was made of some yellow metal, probably gold. Its handle was the head of some repulsive lunar creature which resembled an octopus more than anything else I could think of. The head had a really striking resemblance to a human skull. The tentacles of the thing were wrapt spirally around the lower part of the lever.

Should I tamper with the great machine? Would there be any danger of disastrous consequences? Would it by any chance explode? Would it give off strange and deadly rays? I hesitated. Essayists have written on the topic of my hesitation at that moment, for unknowingly I was then the possessor of greater power than was possessed by any human ruler or dictator that ever lived. With one movement of my hand I could change the destinies of two worlds.

My curiosity decided for me. The chances were that nothing would happen regardless of what I did. I grasped the gleaming golden handle, and tested it to see if it was movable. There evidently was a spring connected with it, for at my first touch it leaped over toward the right end of the scale above which it was poised.

THE first indication that anything had resulted from my act was a slight vibration of the platform beneath my feet. Then I looked up. The flywheel was beginning to turn. It was going more and more rapidly every instant! Within a quarter of a minute it had settled down to an even speed of rotation.

What was happening now? What was going to happen? My nerves were jumpy and I had a vague feeling of panic.

I hurried down the stairs and over to where Paxton was sleeping. A lusty shove aroused him. "I've started it, prof.!" I yelled—"The big engines!" and I pointed toward the center of the room. It was a little time before the sleep cleared from his brain sufficiently so that he could understand what I was talking about.

We went over toward the silently working apparatus, and stood before it watching.

I was becoming distinctly nervous. "Do you know, professor," I said at last, "something is telling me that in a little while this is going to be a rather unhealthy place for us to be. That machine is ages old and its parts probably aren't as strong as they once were. Supposing the forces acting inside of it should get out of control? They might blow us to pieces!"

"Bosh, Jerry," he replied. "Don't be an old woman." But I somehow felt that he, too, was a little uneasy.

Presently it occurred to me that I might try to shut the thing off. When I reached the platform, I found that as far as my puny efforts were concerned, the switch was absolutely immovable.

For what must have been nearly an hour the wheel rotated steadily, and then the Lunar Chrysalis burst its shell. The little doors in the sides of every one of the thousands of metal bottles suddenly clicked open. Paxton had been looking down one of the aisles of dully glowing capsules, and had seen it happen. His eyes fairly bulged from his head.

"Jerry! Look!" he cried.

A violet glow was coming from each of the openings. For what seemed eternity itself, we watched, glued to our tracks, too panic-stricken to move a muscle. I was staring at the open door in one of the metal bottles, which was only a couple of paces from me.

Presently the end of a thin tentacle, tinted like mother-of-pearl, coiled itself delicately over the rim of the opening. Another followed, and then I saw a pair of antennae-like things, which supported on their tips little lavender globes that must have been eyes. They wavered and oscillated back and forth hypnotically. With slow deliberation the thing hoisted itself to the opening in its metal cocoon and squeezed through it. Lightly it lowered itself to the ground, and then, in an unhurried fashion, it proceeded to look me over.

Except for its antennae, which swayed continually, it stood perfectly still. Sons of Satan! Was there ever such a gorgeous and yet hideous creature! It had all the glory and wonderful coloring of a tropic butterfly, magnified to unearthly proportions, and yet about it, with its scores of whip-like tentacles, there was something alien and snake-like, which provoked a shudder. A blue halo which intensified the weirdness of its appearance surrounded it. The Lunarian stood in a semi-erect position, and was about as tall as a man. It had no head as far as I could see. The top of its body was covered with a shiny brown shell, which looked like the calyx of an immense inverted flower. From beneath this shell a sort of mantle projected. It was wonderfully colored in orange and blue and red arranged in artistic designs. It seemed to me then to be a real part of the creature and not an artificial adornment, and I later found that this was true. The antennae, or eyes, as well as the tactile tentacles coiled out from the spaces between the sections of the calyx-like shell. A dozen or so of short thick appendages at the lower end of its body served it as legs.

And now I was conscious of other eyes upon me. A curious groping tentacle was reaching around from behind me to the glazed front of my oxygen helmet. On the point of shrieking, I turned about, and then I saw rank upon rank of the Lunarians, each enveloped in his glowing nimbus. We were completely surrounded.

"What kind of a mess have we gotten ourselves into now, Professor?" I cried.

"I don't know," he answered, "but anyway, keep cool. Things won't go wrong then I'm sure. Just do what they want you to, and try to be agreeable. We'll get out of this all right."

There was a Lunarian on either side of me grasping my arms. The professor was being treated in a similar manner. Someone had opened one of the big metal doors in the wall, and Lunarians in groups of three were entering it. Guided by our escorts, Paxton and I fell in behind the rest.

We were moving down a broad, lofty corridor. Illuminating globes, similar to the one in the chamber of the machine, were set at equal intervals along the roof. The light was reflected many times from the polished granite walls and pavement, and it glinted richly on the little golden pillars, which lined the buried roadway at regular intervals. Each pillar supported on its top a sphere of rosy crystal. I could never then have tried to suggest that those immense globes were really rubies. Ornately carved doors were set between the pillars. We

were walking down a street lined with lunar residences.

The passageway was nearly a mile in length. At last our fantastic procession debouched into a chamber of simply colossal proportions. Its floor seemed to be oval or circular, and its roof swept up into a huge dome. An azure glow, exactly duplicating the sky of a bright earthly day, came from the ceiling. There was a big artificial sun, too, which poured down its hot rays from the center of the dome. In ages past the floor of the chamber must have been a splendid park with green trees, lakes and streams, and fairy-like pavilions. The pavilions and dry beds of lakes still remained, and the trees, too, but the latter were crumbling dead mummies devoid of life.

The army of the Moon Men, with us in its midst, entered the park and proceeded along the white high-ways to its center. Here was the dry bottom of a pond. Beside the pond two big pipes rose upward. Each was fitted with a valve.

Breaking ranks the Lunarians hurried toward the valves and scrambled over them. In a moment a geyser of sparkling water shot ceiling-ward from one of the pipes and began to flood the lake bed. What was coming out of the second pipe I could not at first guess, but when I heard a deep-toned roar which rapidly increased in volume, I knew. The Lunar city was being flooded with air. I looked at the aneroid barometer strapped about my wrist. The pressure was mounting rapidly.

With the coming of the atmosphere, a strange thing happened to the Lunarians. The lavender flame, which had enveloped each of them, disappeared. I concluded, that in the absence of oxygen, this mantle of light must in some way supply them with the life-giving vapor.

FOR several hours we wandered about the gardens with the thronging Lunarians. Our escort led us a short distance to a small, ornately carved building of some bright green material. Its doors swung open to receive us as if some invisible doorman tended them, and when the professor and I had passed inside they swung gently to. The short hairs on the back of my neck showed a decided tendency to stand on end.

We looked at those two folding portals. They were of silvery metal, ornately tooled. No latch or knob was visible, and when I pushed against them they showed every indication of being locked. But maybe this was only because we did not understand their mechanism.

A little exploring told us that we were quartered in the most gloriously beautiful suite of rooms we could wish for. There was a big living room, the walls of which were veiled with dark purple hangings. There was a bedroom with two odd beds in it. Each was suspended from the ceiling by four heavy chains of some metal which may have been silver. A door led from this room into an alcove, in the floor of which there was an oval basin—obviously a bath. Besides, there was a room with many odd instruments and devices in it.

The pressure of the air about us was a trifle less than half normal earthly pressure, and so we decided to try discarding our heavy space armor. The atmosphere of the moon was evidently highly oxygenated, and so we found it perfectly breathable.

Freed from our cumbersome attire, we proceeded to make ourselves comfortable. We lighted cigarettes and

sat down on the soft divans in the living room. I had leaned back languidly, and had just begun to make myself perfectly at home when I heard a whirring sound, and then the hangings beside one of the crystal-glazed windows parted. A silvery sphere with several tentacular arms floated into our presence. A hoarse ejaculation of surprise escaped the professor's lips. In an unhurried, methodical fashion the globe, unsupported by any visible means, glided into the room. Several moments later we heard a gushing of water. During the next few minutes we both enjoyed a hot, perfumed bath prepared and supervised by our mechanical servant. The thing dried us by means of a blast of warm air blown from a sort of register in the wall.

When we returned from our ablutions, a tempting meal had been set out for us on the floor of the living room. There were two metal platters, each of which bore a lump of something, which looked and tasted like highly seasoned meat. We found it very palatable. No forks were supplied, but fingers served very well in a pinch. We weren't particular. Besides, there was a bowl of delicious fruit of several different kinds. And a flagon of water, which had a sharp, invigorating taste. Evidently some stimulating substance had been dissolved in it.

For a time after the meal we talked, trying to straighten out the strange events of the past few hours, but nothing came of it.

"I guess we had better wait and see, Jerry. Frankly I am bewildered," said Paxton.

Presently we went into the bedroom, undressed and wrapped ourselves in silky blankets which our mechanical servant had prepared for us. I, for one, was quickly asleep.

A bizarre little melody produced by a system of gongs, concealed somewhere in the wall, aroused us. We enjoyed a delicious meal of fruits brought by the automaton, and then visitors arrived—two Lunarians who had evidently been given the task of entertaining and instructing us. They led us out into the park and down a long, curving highway.

The lunar city again throbbed with life. Vast machines, invisible to us, were filling the air with whirring. Gaudily marked inhabitants were moving about industriously, evidently hurrying to attend to some business.

Following a throng of Moon Men, we entered a circular building, which appeared to be a depot of some kind. Scores of cone-shaped cars were moving slowly along grooved tracks set in the floor. Guided by our escorts, we climbed into one of these and took our places in seats along the wall. Except for the driver, who stood before the control board in the nose of the car, and the two Lunarians, who served as our guides, or jailers, we were alone.

One of our escorts made a sign to the pilot by waving a tentacle, and then we began to gain momentum rapidly. Through the windows we could see the black opening of a tunnel yawning to receive us. The car shot into it. An illumination globe over our heads gave us light. We were pressed back in our seats by the terrific acceleration. The air in the tunnel, torn by the awful speed of our vehicle, first whistled and then shrieked like a tortured devil. But it lasted for only a few seconds. We glided out into a depot, which may have been many miles from the one we had just left.

Our guides ushered us through an arched doorway

out into the open. We were in another immense cavern, but it was not so richly ornamented as the one we had just quitted. It had been built for utility rather than for beauty. The arching roof was of bare concrete, and it was studded with numerous small illumination globes, instead of being lighted by a single large one.

The bright light glinted up on rows of colossal, silvery forms, which stood in cradles of web-like metal scaffolding. Hundreds of automatons, directed by a few Lunarians, were swarming over them. Just what they were doing, I was, at the moment, quite unable to tell.

Steering us by gently tapping us on our shoulders with their tentacles, our escorts guided us down an aisle between two rows of gleaming shapes. We craned our necks upward. Never have I felt so tiny in my life as I did that day, when I stood beneath those towering masses of metal. We paused beside one of them. It was formed something like a boat—its length must have been a thousand feet and its height nearly a hundred.

"Those things are obviously craft of some kind," said Paxton. "But what do you suppose can be their purpose?"

I was looking at the short cylinders which protruded at regular intervals along the side of the hull and far above our heads. They suggested something sinister.

"It seems as though there is a big war going on somewhere," I said, "and may the Fates help the foe that faces this fleet! There must be at least a thousand ships in this hangar."

A big cylindrical drum was being rolled by a spider-legged automaton up alongside the vessel. Presently the mechanical creature halted and turned the drum up on end without any apparent effort. Even on the moon it must have weighed many thousands of pounds. Using a wrench-like claw, which was a normal part of his anatomy, he unscrewed the cap at the cylinder's top and attached to the opening a flexible pipe, which dangled over the side of the vessel. A throbbing sound, like that of a pump in operation, set in.

"Fueling!" said the professor excitedly. "Getting ready for a trip of some kind!"

Other robots were bringing more drums.

We followed our guides down toward the bow of the vessel until we came to a door in the huge hull. A gangplank led up to it. Signs were made which clearly indicated that we were to climb the gangplank. The interior of the ship was brilliantly lighted. The metal floor was lined with rows of tall tanks, connected with one another by means of cables in much the same way that a group of electric dry-cells are joined.

The Lunarians showed us what must have been the engines of the vessel—bewildering mazes of pipes, cables, rods, and huge masses of framework—the very incarnation, it seemed to me, of brutal, insensate power.

WE wandered over the entire craft, inspecting this, that, and everything. Few things we understood, but everywhere we found evidences of a science infinitely in advance of our own.

About us were the silently working automatons, polishing, oiling, inspecting. Inhumanly, they never glanced up to look at us, and their masters, living, but equally inhuman, paid absolutely no attention to us.

It was with a feeling of relief that I finally entered a car in the depot, and hurtled away from that gigantic, buried cavern, filled with its slumbering giants.



Our guardians left us at the door of the building in which we had been quartered. When we had entered our living room we found a Moon Man seated on a divan, awaiting us. His wavering stalk-like eyes turned about to glance in our direction. Then a dozen or so of his tentacles grasped small levers on the key-board of a rectangular mechanism, which stood on a low stand before him. He manipulated several of the levers, and in unison with his movements a familiar group of English words came to our ears:

"Hello, fellows! Fine day, isn't it?"

The voice had a flat, mechanical quality devoid of all emotion; nevertheless, we were very pleasantly surprised. Perhaps I should say that we were very pleasantly dumbfounded, for that was truly the case.

When I had regained the use of my tongue, I replied: "Greetings, Mr. Lunarian, you look like an agent. What have you for sale—airplanes, or is it radio-vision instruments?"

But the Moon Man had evidently reached the limit of his understanding of earthly humor, or perhaps he was pressed for time.

"I am Number 333," he said. "The Council has sent me to clear up certain things concerning our race, which have evidently been puzzling you very much. Number 503 and Number 8974 have been studying your minds carefully since the Awakening. Your mental vibrations have been recorded by means of a device which is concealed in the ceiling of this room. The information thus obtained has been very interesting; especially were we interested by your peculiar sound language. Several of us, including myself, have mastered it, but since we have no natural organs with which to produce such sounds it was necessary for me to invent the machine which I am now operating. Since it was hastily designed and constructed, it naturally has its faults; but if you will overlook these faults I am sure that it can do much toward clearing up the mysteries which have been troubling you.

"The history of my people begins countless ages before there were any living things on earth. Because of its much smaller size, and consequent greater radiating surface in proportion to its bulk, the moon cooled down from a molten state long before your planet. There was plentiful sunlight, atmosphere, and water. Conditions were ideal for life, and so nature, with its inevitable and inexplicable alchemy, proceeded to produce life. It began in the tepid seas, and then gradually spread over the adjoining plains, which became vast stretches of woodland, teeming with various species of animals.

"These creatures were continually in competition with one another. Realizing that the time was short, nature quickly selected one, which, because of its intelligence and hardiness, seemed best fitted to survive.

"These ancestors of mine were quite similar to me in appearance; they had the same tentacles, and the same multi-colored mantles, and, next to their intelligence, the most important characteristic—a sort of hard shell, in which they could seal themselves up during the nights, which were already very cold.

"By the time the ancient Lunarians had discovered the use of fire, the moon must have begun to show signs of age. The numerous volcanoes which had formerly replenished the constantly leaking atmosphere by a steady flow of carbonic acid gas, were dying out one by one. In consequence, the air became rapidly rarer.

The ability of a planet to retain its gaseous envelope depends on its gravitational force. Lunar gravity is too weak to prevent the air from floating off into space in a short time.

"Like oxygen and nitrogen, water vapor also leaked away, and the oceans began to shrink. Thirsty deserts began to creep down into the lowlands.

"Meanwhile, the terrific tidal drag of the earth was stopping the rotation of Luna on its axis. The drying ocean beds, under the glaring sun, which lingered longer and longer in the heavens, became during the day veritable furnaces of heat. The long nights were terrifically cold.

"My ancestors inhabited a section of territory on the side of the moon now invisible from the earth. It was a wild country, cut up by high rocky ridges and deep valleys. Everywhere were those huge, sleepy lava-pits which seldom erupted, but which always poured forth clouds of smoke and vapor. All about lay impassable deserts and high mountain ranges beyond which no Moon Man had ever dared to venture.

"The earliest knowledge of mechanics and science, which the early Lunarians gained, was acquired through the practice of irrigation. Water from the melting snows on the mountain summits was collected in reservoirs, and pumped into ditches which conveyed it to the growing plants.

"The danger of over-population was offset by almost constant warfare between the various tribes. Walled cities were built in strategic positions. Protected by the ramparts of those cities, the more intelligent of our race were given sufficient leisure to devote themselves to science and art. Metals came into extensive use, and mechanics developed. The crystal-clear nights gave splendid opportunities to the astronomer. The stars were mapped and studied and the relationship of our planet to the earth, still a glowing mass of lava, was determined.

"All went fairly well until a short time after the moon had ceased to rotate on its axis relative to its primary. In rapid succession the volcanoes all about us became extinct. The tidal pull of the earth must have been shifting the molten core of the moon away from these vents. The atmosphere, which had hung like a vast cloud over our homeland, began to rarefy. The water, relieved of much of the pressure of the air, quickly evaporated. Crops became inadequate, and the desert took possession of much of the arable land.

"For a hundred years or so the Moon Men led a semi-nomadic existence. The population, which had numbered about four hundred thousand souls, dwindled rapidly.

"Driven by sheer desperation, the survivors of the various tribes banded together and prepared to migrate. They packed up their scanty food supply, a few masterpieces of art and literature, and some scientific instruments. Then they started out into the untracked desert, which lay to the southwest.

"The ancient historians have vividly portrayed the events of the Great Migration. There were a few power-driven automatons in the van, but, owing to the scarcity of oil fuel, the inhabitants carried most of their supplies on their backs, or slung in litter-like contrivances.

"Across blazing, sun-lit plains that parched the skin, up high mountain slopes and down into deep valleys, the queuing caravan moved, and always along the way it left the carcasses of its dead. Some tumbled to destruc-



tion from the summits of jagged ridges, and thousands died of hunger and thirst. In the lowlands, which had been sea bottoms, the air was thin but breathable, but on the higher plateaus it was frequently so rarefied that the gasping lungs of many of the weaker individuals gave up the fight, and the unfortunate creatures collapsed in their tracks. Not daring to help their fallen comrades, the others pressed on.

"When night came the weary wanderers incased themselves in their cold-resisting shells and burrowed into the deep sand.

"Sometimes, so the historians say, just at dusk, they would see queer purple and red sheets of flame flashing over the plains—obviously phenomena of the rarefied air similar to your northern lights. Only they were close to the ground.

"When the sun rose again, a single Moon Man, piloting a crude, bat-like flying machine, which had recently been invented, would swoop upward on flapping wings and take a look at the surrounding country in search of the best course for the caravan to follow. During the day the flier made frequent trips aloft. Throughout their wanderings my ancestors took this ornithopter with them, slung in a sort of cradle, which required a hundred pilgrims to carry. It proved to be of inestimable help, and probably was the means of saving the race from extinction. When the scanty supply of oil for its motor had been used up, they supplied it with fuel by frying down the bodies of their dead in an improvised sun-furnace.

"At length, after the caravan had dwindled to twenty-five thousand, the Lunarians climbed the range of mountains and came out on an area of typical lunar country, with scattered volcanoes and long chalky rills. Those rills were the white rays of Tycho, still many miles away.

"The Lunarians followed one of the rays, and as they progressed they became more and more hopeful. The atmosphere was growing rapidly denser. At comparatively frequent intervals they came upon clusters of cactus-like plants, which had been very rare elsewhere. These plants held stores of water in the cavities of their pulpy leaves, and besides, in an emergency, they could be eaten. My ancestors ate them, just as in a famine-ridden country, starving men of your own earth have often eaten grass.

"The arrival of the pilgrims at the brink of the Promised Land has been written about and painted countless times during the golden age of our history. All through the long, hot afternoon, the wanderers had been struggling up the eastern slopes of Tycho; but in spite of their weariness their hearts were singing. As least they were not gasping for breath, and besides, they were in the pleasant shade of the mountains. Beyond the rampart they felt certain was a place where with diligent effort they could win a chance to live.

"Just at sunset the first of the van reached the summit of the barrier, and then they saw what the pilot of the flying machine had seen hours before. Deep down in the immense depression, where the shadows were deepening, was a glassy little lake that reflected the blue sky. Beside it was a jungle of vegetation. A faint breeze blew over the rim of the crater. Somewhere down there there were vents which were pouring forth volumes of air, steadily replenishing the dense cloud of

life-giving vapor which hung over the surrounding territory.

"The lunar night was half gone before the remaining ten thousand wanderers could descend, with the aid of metal cables, to the floor of Tycho. Their eagerness prevented them from waiting until dawn. The blanket of air retained the sun's heat sufficiently so that there was no danger of anyone freezing to death—a thing which most certainly would have happened on the almost airless plains.

"Everyone had a drink of the water of the lake, and then the contented pilgrims buried themselves in the sand and slept. When the next day came, they began to lay out the plans for their new city.

"Thus dawned the era of the greatest prosperity that the moon has yet seen. The floor of Tycho, as well as the surrounding territory, was fairly well suited for a hardy form of life, and so the Moon Men proceeded to convert this new land into a great garden.

"For fifty thousand years the Lunarians, aided by their evergrowing knowledge, lived in perfect comfort. Not only did their science become more extensive, but their minds grew increasingly keen until feats of memory and reasoning, which would have been completely impossible in former ages, were accomplished with ease.

"But always hostile nature fought against them with ever-increasing cunning. The gases which poured out of vents in the floor of Tycho became less and less in volume. As a result, the atmosphere rapidly rarefied. Similarly, the water was vanishing, and thus the area of land that could be irrigated decreased. The cultivated fields were roofed over to keep in the warmth and to lessen the leakage of air and moisture into space. The city now consisted of an immense labyrinth of underground passages and chambers, which could be hermetically sealed from the out-of-doors.

"Something would have to be done soon to alleviate the situation, or else the whole race would become extinct. There were ways of checking the leakage of the vital elements, but there was no means of absolutely preventing it.

"For a long time before I was born, astronomers had been looking hopefully toward the earth. In some distant day that still dully glowing sphere of hardening lava would cool sufficiently so that we could establish ourselves there. But before the coming of that time the moon would be only a dead cinder of a world, devoid of all life except, perhaps, a few of the simplest forms of vegetation.

"It was I, Number 333, who solved our greatest problem. We are naturally a hibernating race. Why not sleep until the great planet, which shone so brilliantly in the night sky, would be ready to receive us?

"After a long period of experimentation I discovered two gases. One, when taken into the lungs, produced complete suspension of animation. Under its influence, any living thing could sleep for ages, without any decay of its body tissues. The other was an active stimulant capable of arousing a subject from that sleep.

"The rest was easy. A thousand space-ships were built to carry us and our equipment to earth, when the time came. Each of the ships was heavily armed, for we feared that when we migrated there would be flying monsters similar to those which once inhabited the moon on the larger planet. All the water and air we could collect was imprisoned in underground reservoirs. Food

was stored and the seeds of plants, preserved by the sleep-producing gas, were packed safely away.

"The great machine, which you found in the chamber at the bottom of the well, was constructed. It is nothing more than a pump, to force the anaesthetic to the steel cocoons, to draw it off again at the end of a certain period, and then to force the reviving vapor to the sleepers.

"At length all was ready. We shut the airtight gates of the city and descended to the chamber of the pump. Calmly each of us crept into the cocoon which had been assigned to him by number. The doors clicked shut and the machine, actuated by an automatic device, began working.

"I recall clearly the last moments of my wakefulness before the long sleep. I was resting on the upholstery inside the metal bottle. Above me a faint light sifted in through the glass door. Presently I smelled an overpowering sweetness, like the perfume of a certain purple flower which, in the moon's youth, used to grow with such profusion along the edges of the lunar seas. My consciousness wavered; the last thought that passed through my brain before I slept was whether the time-clock connected with the starting mechanism of the pump would set the machine in motion at the end of two hundred and fifty million years.

"Of course it will," I said to myself. "It is too simply and perfectly constructed to do otherwise."

"The ages passed like an instant. We awoke; a hasty study of the thoughts in your mind, and of the existing terrestrial and lunar conditions told us that the time-clock had failed, and that we had slept many millions of years longer than we had planned. We are deeply grateful to Mr. Gerold Olson for throwing the switch that freed us, even though he did it unintentionally."

The monotonous voice coming from the box ceased. A door opened and two Lunarians entered. There was an exchange of tentacular signs between Number 333 and the new arrivals. Then the voice began again:

"Gentlemen," it said, "Number 6042 and Number 9435 have orders to take you up into the crater immediately. The space ships are to be given a test flight, and it has been decided that you are to see it. Don your space armor. When you return I shall tell you more."

A tunnel-car carried us in a few seconds to the silent plain within Tycho's ramparts. We emerged through an opening in the ground, which the Lunarians seemed to have just freed from the accumulated dust and debris.

Our guides were beside us. They were again enveloped in their protecting auras of blue light. We were standing on the brink of a great rectangular opening which yawned at our feet. We peered downward. In contrast to the intense glare of the sun the glow of the bottom seemed like semi-darkness.

Far below I saw moving patches of light and the sheen of something big and gleaming.

We had been looking silently below for some time when suddenly a dazzling yellow ray came into being. Then a mighty bulk shot up from the depths with such speed that it was far over our heads before we saw what it was. A space ship! The hole before us was a huge door in the roof of the chamber that housed the Lunarian interplanetary vessels. Another craft whisked up past us, and then at timed intervals of about ten seconds they continued to come.

The first twenty formed a "V," and then, propelled

by yellow rays projected from nozzle-like devices at their sterns, they rushed toward the western wall of the crater. Long before they reached them a great section of the encircling mountains before them vanished, blasted into nothing by some unguessable magic of science.

I can imagine how I looked then—eyes bulging and ghastly pale. I turned toward Paxton, and then for a time we stared at one another both frozen into cat-like crouches of complete terror. The ships continued to shoot up past us and to conduct their aerial circus far over our heads—wheeling, darting, and driving.

"Did you see that, Jerry?" gasped the professor. "And they're going to earth; they planned it maybe three hundred million years ago. They'll smash us—our cities, our works of art, our knowledge—everything. Maybe they'll wipe the whole race out of existence! Those weapons, my God! But the human race will fight! See, there is the *Black Meteor* only half a mile away. If we can get to it, we'll go back and give our people a warning. By God, we'll do it! Come on, lad!"

WE turned about, and adopting the most rapid means of locomotion on the moon for a man on foot—jumping—we began to move rapidly toward the conical black tower which was our space ship.

Our guides leaped after us for a short distance and then gave up the pursuit. Why they did so I was then quite unable to guess, for they covered the ground fully as rapidly as we did.

We entered the *Black Meteor* and climbed to the control room. If the Lunarians had ever invaded the ship, they had apparently not disturbed anything.

With frantic haste the professor tugged at the starting lever. The rocket motors roared into life. We were shooting upward at a terrific rate. The awful pressure of acceleration made it almost impossible to breathe.

Anxiously we watched the view-plates for the expected pursuit, but it did not come. The ships of the Moon Men continued to whirl and maneuver within the ramparts of Tycho, rapidly dropping away beneath us. In a few moments those ships had so diminished in size that they looked like silvery beetles crawling about on the ground.

As soon as the *Black Meteor* was under way Paxton went to the radio room and gave his warning. "Hello, Earth!" he called, "Paxton of the Moon Rocket speaking. The Lunarians are coming with a thousand armed space ships. Prepare for war!"

Throughout the homeward voyage, I navigated and guided our vessel without any assistance from my companion. He spent all his time in the radio room, talking with terrestrial stations, and in consequence very few words passed between us.

The sight of the vast Lunarian battle fleet, and the realization that humanity was facing a greater and more bizarre danger than it had ever faced before seemed to have numbed my mind. I did not know what to think. In a vague sort of way I felt that it was odd that the Lunarians had treated us so well. Were they not our enemies? But why try to explain the actions of a people so totally alien? After all, were they so alien? Earthmen ordinarily treat their prisoners of war with consideration. Personally, I had sensed behind the mechanical voice of the Lunarian, who had related to us the history of the moon, a kindly something which might easily respond to friendship.

When we landed on the earth we found it in a whirlring turmoil of activity. Paxton's story had been pretty generally accepted as truth. Astronomers had seen queer things happening in Tycho. They certainly could not believe that we were responsible for the vanishing of a quarter of its wall in an instant!

The armies of the world were being mobilized. Hundreds of thousands of planes were being concentrated near the great cities, ready for action. There were swift pursuit ships capable of speeds in excess of five hundred miles an hour. They carried those wicked little machine guns which fired bullets as fine as needles but impregnated with a poison that meant instant death. There were giant bombers—veritable battleships of the air. Besides, there were millions of commercial ships which had been commandeered and equipped to meet the enemy. The united armadas of the earth seemed like a force of unlimited power, but when I remembered the shining bulks, which had rushed through the lunar skies armed with weapons that dissolved mountains like a mist, it paled into pitiful insignificance.

For nine days after our arrival the earth watched, like a defiant beast, fortifying itself as best it could. Then one night, a swarm of tiny specks began to trail out of the moon like hornets coming from a glowing hornet's nest. Just before dawn the next day, they shot into the terrestrial atmosphere over central North America. So great was their speed that they left trains of fire behind them like falling meteors.

During the interplanetary journey, the observatories kept the various air fleets constantly posted as to the position of the Lunarians. It was possible to tell about where they would enter our atmosphere, and so when they arrived fully a million fighting planes had collected from all over the United States to meet them.

They were lined up in orderly rows on the great Hinton Flying Field located about seventy-five miles west of Milwaukee. Others were constantly coming in.

For hours during the night the pilots had stood close beside their machines. A few carried on conversations consisting for the most part of a few monosyllabic words with one another. But nearly everyone maintained a tense and expectant silence. I was among the rest.

When the first dim glow of morning was welling into the east, two hours before the Lunarian fleet streaked into the earthly air, a siren began to hoot weirdly. Its far-reaching call could be heard for miles around. Time to take off!

With the calmness of one resigned to his fate, I climbed into the cockpit of my trim little craft. I closed an electric switch on the instrument board. There was a loud report, and then my Diesel motor roared into action. There were other reports coming from down the field—so many that it sounded like a sham battle. And the thrumming of warming motors grew ever greater in volume.

For a minute I busied myself with my equipment—my safety belt, my oxygen mask, my heavy electrically-heated gloves, my little devil-riveter of a machine gun. Yes, all was ready. I tested the controls—O. K. Then the siren blew two short blasts. Take to the air!

In rows of a thousand abreast, at timed intervals, the planes rolled down the field and slipped into the sky toward the east. I was among the first to leave.

According to the plan which had been worked out by

our best aerial tacticians, each group of a thousand was to act as a military unit, and was to attempt to bring down an enemy battleship.

ONCE in the air, each squadron formed into a compact "V," and then began to climb. And, oh, what a climb it was! Up, up, up, into the icy air until it seemed that the gates of the Empyrean must be ready to receive us.

Thirty thousand, thirty-five thousand, thirty-eight thousand feet we ascended, and there we began to cruise. All eyes were on the squadron commander's plane flying at the apex of the "V." Presently a puff of gray smoke appeared above it. At the signal, each man catapulted a small grenade above him by means of a sort of spring-gun. Those grenades exploded, and formed a dense protecting layer of smoke, that looked like natural clouds, over our heads. The other squadrons behind us hid themselves in a similar fashion.

We wheeled and circled about, close under the vapor shield, waiting for developments. Our squadron was now above the city of Milwaukee beside Lake Michigan, which spread out like a gray picture of calmness in the gray dawn. Nature apparently cared nothing for the fate of man.

A bright silvery streak in the east where the stars were fading. Another and another; then five or six all at once. The Moon Men had come! They were entering the atmosphere at a point over the lake about twenty-five miles distant from us.

A faint wind was blowing our cloud toward the northeast. We followed it. This was favorable to us, for now Milwaukee would not be in any danger of receiving any damage from our bombs.

As I wheeled and banked my plane, I studied the enemy fleet through my binoculars. I could see the long string of lighted portholes along the side of each vessel. What foolishness was this? Why did they expose themselves so boldly in enemy territory? And then for a moment, I felt with a touch of bitterness, that they realized that we were powerless to harm them. But I quickly checked the thought. It seemed traitorous and cowardly.

The battleships which had entered the earth's gaseous envelope were moving at a snail's pace toward us. The light of the sun, not yet visible to us, struck the polished metal of the craft still out in space, and made them glow like a string of glorious stars.

A little nervously we waited. Had the Moon Men discovered us? It seemed hardly likely. In the faint half-light, hidden as we were close beneath the smoke clouds, there seemed but slight likelihood that we had been seen. The droning of our motors was drowned by the louder roar of the propelling mechanisms of the mooncraft.

The enemy fleet crept on toward us. The ships were moving in a long column, four abreast. They were at a somewhat lower level than we were. Like a shadow our entire force zoomed upwards through the smoke screen. Cautiously we scattered more grenades.

Though, under all ordinary circumstances, we were now perfectly invisible to our foes, we could still see them clearly through the vapor with the aid of the Richter Ray attachments on our binoculars. The Richter Ray, as everybody knows, resembles the X-ray in its powers of penetration and its ability to produce fluores-

cence, but it is vastly superior to the X-ray in that it can be focused and thus can produce real pictures instead of mere shadows.

An observer on one of those opposing vessels would have seen only a majestic bank of what appeared to be thunder clouds, dull gray like tarnished silver, unless the Lunarians possessed devices similar to our ray binoculars. I sincerely hoped that they had never heard of the Richter Ray.

Our foes were coming closer. Now a group of four battleships, the leaders of the van, were passing directly under the cloud which our squadron had formed. An involuntary thrill came over me, as I realized how majestic and wonderful they were. Around each huge hull was a faint halo. Those halos looked like the frost rainbows which sometimes appear in the upper air. But that was impossible, for there was no sun.

How easy to blast those giants out of existence with our bombs! We were waiting for Lieutenant Stanton, the squadron commander, to discharge a blue rocket—the signal which meant action. But he was not in a hurry. The Lunarians seemed to be still ignorant of our presence. Let the squadrons behind us take care of the first four. We would pick other victims.

Suddenly it occurred to me that it was queer to the point of ridiculousness that such highly intelligent foes were blundering into such a trap!

Another group of four passed under us, and another and another. I watched Stanton's bomber, wheeling and circling almost a thousand feet from me; still there was no sign. But when the next group glided under our bomb-racks, he made up his mind. Certainly, the apparently stupid Moon Men must have discovered us by now! Our cloud had grown thin in spots!

A purple tongue of light leaped up from the bomber. What luck! Four in the bag! Bombs were falling like rain. In a couple of seconds a shower of metal scraps would be all that would be left of the great ships. And then, as I looked down at our victims, I saw something odd. My bombs were hurtling straight toward the deck of the craft below, but as they approached their target, they swerved aside, pushed by some strange force, and continued to tumble down toward the surface of the lake. The halos were protecting the battleships!

A feeling of bitterness came over me. What chance had we against these demons who could make our every weapon useless? Presently their rays would sweep up at us, and a few minutes later earth's last hope of salvation would be destroyed as completely as if it had never existed. But the instinct of self-preservation demands that every creature should die, trying to save itself. We must fight! We would fight!

I pulled my joystick sharply back and gunned my motor. As I zoomed upward, I saw that a number of other pilots were doing the same, I intended to dive down upon one of the Lunar battleships from a greater altitude, meanwhile spraying it with machine gun bullets. I continued to climb vertically for about a thousand feet, then I turned the plane quickly over on its back and started down. Our cloud was thinning rapidly. My machine gun had begun to hum like a low-pitched tuning fork, but if the tiny pellets had penetrated the force shield of the battleship and had done any damage to the automatons that swarmed its decks, there was no evidence of it.

Hundreds of machine guns were buzzing now, the

air was filled with the din of bursting shells, and bombs were still dropping. But behind their thick walls of force, the Moon Men were as safe as though a million miles separated us from them. They made no move against us.

I had dropped eight hundred feet, and was preparing to climb again, when I heard a sound coming up from below where the Lunar craft were gathering. It was deep and sonorous, and powerful enough to be heard above the noise of the battle. Could it be true? A voice? Yes, it was true! Something down there was speaking English words, and what it said made me wonder for a moment if I were not really dreaming.

"Cease firing, Earth Men," it boomed. "The People of the Moon come in peace. We only wish to ask a favor. Grant us the privilege of taking a small portion of your atmosphere and water back to our world, so that we shall be able to make life bearable there. Our payment will be great. We shall teach you the secrets of our vessels and our rays, we shall open for you, doors giving access to knowledge, of the existence of which you have never dreamed. We shall check those forces, which, if left unhindered, would eventually make your world uninhabitable. Besides, we shall always try to be your friends and guides. Will you agree?"

The mechanical voice died away, and with it the pounding of shells and hum of machine guns.

THE first feeling which came over me was one of mingled consternation and relief. We had expected the complete destruction of our civilization and perhaps our race as well; yet these supposed blood-thirsty Moon Men were making an offer, which would mean nothing but good for us. Then suddenly I began to suspect that we were being tricked. There must be a catch somewhere! Fairness with creatures of lesser knowledge and civilization has seldom been the way with men.

The Voice spoke again: "The thoughts of many of you indicate that you doubt the honesty of our purpose. Very well. We shall stop the generators, which maintain our protecting force-shields. Then we shall proceed under guard to your flying field. Since you will be directly over us, it will be a small matter for you to destroy us, should we show any indication of breaking faith. We trust you."

And so our suspicions were allayed. If the Lunarians desired to conquer us, there was certainly no reason why they should make this move.

The little radio-buzzer over my ear was ticking out a command in code: "Feather-formation over Lunar fleet—Head back toward Hinton Field—"

Thus our bloodless encounter came to its glorious end. Within fifteen minutes the world had heard about it, and had begun its orgy of celebration. Two hours later the governments of every important nation had agreed to the proposition of the Moon Men.

It was nearly noon before all of the craft of the two great fleets were landed at the Flying Field. About us, kept back by ropes, and by the diligent efforts on the part of the police, was a vast crowd of spectators.

In the company of Professor Paxton, who had come by fast rocket plane from the observatory at Flagstaff, I wandered among the towering rows of ships that lined the field. About us were the Lunarians and their busy automatons.

Presently we met Number 333, recognizable by the

peculiar green markings on his mantle. He knew us as soon as he saw us. "Greetings, Friends!" were his first words. I knew at once that he carried a much improved speech mechanism, for his voice, which came from a tiny box at his side, had lost its flatness. How he operated the device, I could not tell.

"There seems to have been a slight misunderstanding between us," he continued. "Your departure from our world was rather sudden. If you had waited long enough for me to tell you more, I think you would have been reassured."

Professor Paxton and I made profuse and somewhat sheepish apologies for our blunder. Then we asked the Moon Man to tell us more about his people's plans. Just what would they do now that the human race was in possession of the earth?

"When we saw that this planet was already inhabited by an intelligent form of life, we were rather puzzled as to what move to make," said Number 333. "Of course, we might have landed in the south polar regions, and started to rebuild our civilization there without disturbing anyone very much. But such a procedure has certain drawbacks, the greatest of which is that for a large portion of the year our sun motors would not be able to operate.

"It is to Number 2434 that we owe the solution of our problem. Three days ago, he invented a peculiar form of generator which has the power to 'crystallize' the ether of space about the machine for a distance proportionate to the amount of energy being consumed.

"Crystallized ether has been known for many ages. It is an electrical phenomenon and can be brought into being by means of certain electro-magnetic vibrations. You saw today what it was like, for we surrounded all our battleships with a protecting shield of it. It has many of the properties of normal matter, including solidity, or semi-solidity; but it lacks mass.

"It was not until Number 2434 invented his generator that we could produce a large enough volume of crystallized ether for the purpose we had in mind. But now everything is easy. We plan to form a vast, spherical shell all around the moon, and about a hundred miles above its surface. For this purpose, two big generators will be constructed. A few minutes after they are set in operation, the shell will be formed. If we desire it to disappear for any reason, it will be only necessary to shut off the power. Beneath the shield we will seal our borrowed atmosphere forever, against leakage into space. Thus the moon will become habitable again.

"Part of the payment for the gifts you Earth Men give us will be a similar, though necessarily much larger, shield around the earth."

Number 333 took us on a tour of exploration through the Lunar camp, and then at Paxton's suggestion, we decided to introduce our weird companion to the mysteries of earthly life. We all climbed into the cabin of the professor's plane, and a moment later we were roll-

ing down the field and into the air, all our fears gone.

Some minutes later we rented a monocoar at one of Chicago's landing stages; then we plunged into the whirling activity of the city, magnified many times by the titanic celebration that was in progress. Though he gave no sign that I could interpret, I am quite sure that Number 333 was somewhat more than a little bewildered. The flashing lights along Michigan Avenue, the din, the crowds of people thrown into a kind of ecstasy by the tremendous events of the day, and finally, the vastness of the city, with its seemingly endless avenues, were so totally different from the silent majesty of the moon, that I do not see how it could have been otherwise.

Nor was I any less affected. How was it possible for me, Jerry Olson, to be riding in this perfectly prosaic little vehicle, with a weird creature from another world as a companion? Such things didn't happen even in nightmares!

The Day of the Arrival is now fifty-three years in the past. Things have happened, just as Number 333 said they would. Tonight, as I look out of my window, I see the moon rising over the maple trees. The sky everywhere has a pale, greenish tinge, which dims the stars a little, and the moon has a green halo. The shields of crystallized ether are faintly phosphorescent at night. Earth has become almost a paradise. From pole to pole a balmy, spring-time climate prevails, for the heat of the sun, once transmitted to our planet, cannot escape rapidly through the shield.

And Luna! Her day is now only forty hours long, for her people have found a way to increase her rate of rotation. The air and water carried from our planet in hollow spheres of crystallized ether have rapidly transformed her into a fairyland of growing things. Bizarre and beautiful plants have formed thick carpets of vegetation over those portions of her surface which are still uninhabited. The walls of many of her craters are already festooned with green vines to their very summits. Many of the hitherto desolate plains have become rich farmlands. The population of the moon has doubled and is increasing rapidly.

Between earth and its satellite a lively commerce is being carried on. Huge interplanetary liners, as well as many freighters, are constantly plying back and forth. Every winter thousands of earthly tourists flock to the Lunar cities to admire their lacy architecture, and to enjoy themselves along the seashores and on the steep mountain slopes.

My youngest son, Dan, is leaving for the satellite tomorrow for he plans to study there, in the House of Learning. He is a medical student. Number 333 will be one of his instructors.

But it is still impossible for an earthly human being to tell what greater wonders are yet to come forth from the Lunar Chrysalis.

THE END.



Concluding a Thrilling New Serial  
of Interplanetary Life and Travel  
by Edward E. Smith, Ph.D.

Author of "Skylark of Space," and "Skylark Three"

## PART III

# Spacehounds of IPC

**T**HE question of rays—their expanding power for good and evil—is receiving increasing attention from scientists. The x-ray has been found to be very beneficial, given in certain quantities, but extremely inimical to health, and even fatal, if too much exposure is given. The powers of the cosmic rays have not been fully discovered as yet. And there is no reason to doubt the theory that there may be found still more destructive and powerful rays. Even wars are becoming a more dangerous plaything for nations of our world—to say nothing of other possible enemies from other parts of our universe. Stevens and Nadia Newton meet with thrilling experiences galore in this concluding instalment.

### What Went Before:

**T**HE Interplanetary Vessel *Arcturus* sets out for Mars, with Breckenridge as chief pilot, carrying on board, besides its regular crew and some passengers, the famous Dr. Stevens, designer of space ships and computer. He checks computations made by astronomers stationed in floating observatories, and after he has located any trouble and suggests a plan for minimizing the hazards of the trip from the earth to Mars he reports his findings and suggestions to Mr. Newton, chief of the Interplanetary Corporation.

Stevens then takes Nadia, Mr. Newton's beautiful young daughter, on a specially conducted sight-seeing tour of the *Arcturus* and thoroughly explains to her all of the works of the vessel. Nadia has herself had a good science education. While they are down at the bottom of the ship—nearing the end of their tour—Stevens feels a barely perceptible movement of the vessel from its course. When he turns on the visiplat, he is horrified to find that a mysterious ray of unparalleled power has neatly sliced the *Arcturus* in several places.

Nadia and Stevens are completely separated from the rest of the crew and passengers of the ship, so they get into a lifeboat, which is equipped for a limited amount of space travel. Despite the strict and apparently effective vigilance of the enemy destroyer, Stevens and Nadia make their getaway in the lifeboat, which they aptly call "Forlorn Hope," and finally make a safe landing on Ganymede, where Stevens almost completes a power-plant and a radio transmitter, to enable him to communicate with the earth or with the IPV *Sirius*, which is used by Westfall and Brandon (two of the world's best scientists) as a floating laboratory.

They start for Cantrell's Comet, where Stevens acquires the necessary material for his giant transmitting tube, heads back to Ganymede, when their ship is cut, top and bottom, by a strong ray-beam. Stevens and Nadia soon find that the other ship is manned by friendly beings from Saturn. Together they plan against their common foes—the Hexans—who are enemies of the universe. After helping the Saturnians to repair their power plant, they start back to Ganymede, aided by their new friends from the frigid civilization. Finally, however, Stevens succeeds in connecting, by radio, with the *Sirius* and his scientist friends on board it, who rush to the aid of the two castaways. It is while the castaways are captives of the Hexans that help looms near.

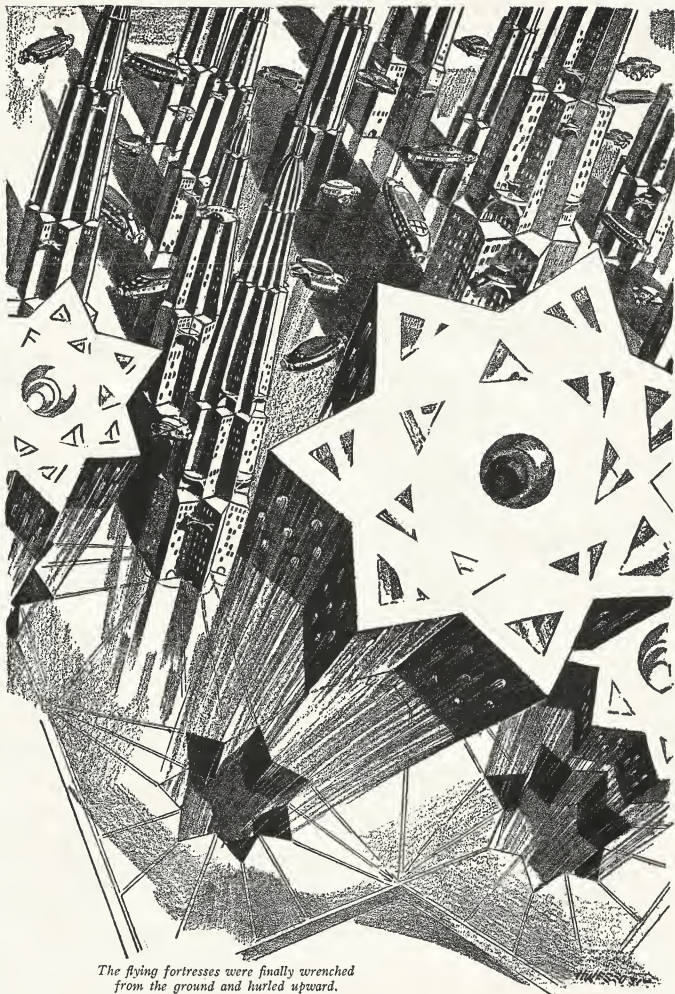
### CHAPTER IX

#### The Sirius Takes a Hand

**T**HE *Sirius* loafed along through the ether at normal acceleration just outside the orbit of Mars and a million miles north of the ecliptic plane. In the control room, which had been transformed into a bewilderingly complete laboratory, Norman Brandon strode up and down, waving his arms, his unruly black hair on end, addressing savagely his friend and fellow-scientist, who sat unmoved and at ease.

"For cat's sake, Quince, let's get busy! They're outside somewhere, since the police have scoured every cubic kilometer within range of the power plants without finding a trace of them. We've got the power question licked right now—with these fields we can draw sixty thousand kilofranks from cosmic radiation, which is lots more than we'll ever need. We haven't drawn a frank from a plant in a month, and we've had to cut our field strength down to a whisper to keep from burning out our accumulators. We can hunt as far as Neptune easy—we can go to Alpha Centauri if we want to. This thing of piffing and monkeying around here's pulling my cork, and for the ten thousand four hundred and sixty seventh time I say *let's prout and prout now!* In fact, I'm getting so sick of sticking around doing nothing that I'm going out anyway, if I have to go alone in a lifeboat!"

Impetuous and violent as Brandon had always been, never before had he gone to such lengths as to suggest



*The flying fortresses were finally wrenched from the ground and hurled upward.*

a disruption of the partnership; and Westfall, knowing that Brandon, in his most violent moments, never threatened idly, thought long before he replied.

"You will not go alone, of course. If you insist upon going without further preparation I will go too, no matter how foolish I think such a course to be. We have power, it is true, but in all other respects we are in no condition to meet an opponent having command of such resources as must certainly be possessed by those who attacked the *Arcturus*. Our detectors are inefficient, our system of vision is crude, to say the least, and many other things are still in the experimental stage. We have not the slightest idea whom or what we may encounter. It is all too probable that we would simply be throwing away uselessly the lives of more good men. It is also foolish from a general viewpoint, for as you already know, we and our assistants happen to be in better position to study these things than is any one else at the present time. However, I will compromise with you. We can learn much in a month if you will really try, instead of wasting time in fuming around the ship and indulging in these idiotic tantrums. If you will buckle down and really study the problems confronting us for thirty days, we will set out at the end of that time, ready or not."

"All x. I hate to do it, but we've been together too long to bust it up now," and Brandon turned toward his bench. Scarcely had he reached it when a series of dots and dashes roared from an amplifier. Both men leaped for the receiver which had so unexpectedly burst into sound, reaching it just as it relapsed into silence, and from the tape of the recorder they read the brief message.

"...h four seven ganymede point oh four seve..."

"That's Steve!" yelled Brandon. "Nobody else could build an ultra-sender! Direction?"

"No need of calculating distance or direction. Ganymede is the third major satellite of Jupiter."

"Sure. Of course, Quince—never thought of that. Dope enough—point oh four seven."

As Stevens had told Nadia, the message was completely informing to those for whom it was intended, and soon Brandon's answer was flying toward the distant satellite. He then started to call the officers of the Inter-planetary Corporation, but was restrained by his conservative friend.

"It would be better to wait a while, Norman. In a few hours we will know what to tell them."

At high acceleration the *Sirius* drove toward the Jupiter-Earth-North plane, and Brandon calculated from his own bearings and from the current issue of the "Ephemeris" the time at which Stevens' reply should be received. Two minutes before that time he was pacing up and down in front of the ultra-receiver, and fifteen seconds after it he snapped:

"Come on, Perce, get busy! Shake a leg!"

"Oh, come, Norman; give him a few minutes' leeway, at least," said Westfall, with amused tolerance. "Even if your calculations are that accurate—which of course they are," he added hastily at a stormy glance from hot black eyes, "since we received that message direct, instead of through one of our relay stations, Stevens probably has been throwing it around for hours, or perhaps days, looking for us, and the shock of hearing from us at last might well have put him out of control for a minute or two."

The carrier wave hissed into the receiver, forestalling Brandon's fiery reply, followed closely by the code signals they had been expecting. As soon as the story had been told, and while Brandon was absorbed in the scientific addenda of Stevens, Westfall thoughtfully called up Newton, Nadia's father.

"Nadia is alive, free, safe, well, and happy," he shot out without preliminary or greeting, as soon as the now lined features of the director showed upon the communicator screen, and the careworn countenance smoothed magically into the keen face of the fighting Newton of old, as Westfall recounted rapidly the tale of the castaways.

"They apparently have not suffered in any way," he concluded. "All that Stevens wants is some cigarettes, and your daughter's needs, while somewhat more numerous than his, seem to be only clothes, powder, perfume, and candy. Therefore we need not worry about them. The fate of the others is still unknown, but there seems to be a slight possibility that some of them may yet be rescued. You may release as much or as little of this story as may seem desirable. Stevens is still sending data of a highly technical nature. We shall arrive there at 21:32 next Tuesday."

IN due time the message from Ganymede ended and Brandon, with many pages of his notebook crammed with figures and equations, snapped off the power of the receiver and turned to his bench. Gone was the storming, impetuous rebel; his body was ruled solely by the precise and insatiable brain of the research scientist.

"He's great, that kid Perce! When I see him, I'm going to kiss him on both cheeks. He's got enough dope on them to hang them higher than Franklin's kite, and we'll nail those jaspers to the cross or I'm a polyp! He's crazier than a loon in most of his hunches, but he's filled four of our biggest gaps. There is such a thing as a ray-screen, you kill-joy, and there are also lifting or tractor rays—two things I've been trying to dope out and that you've been giving me the Bronx cheer on. The Titanians have had a tractor ray for ages—he sent me complete dope on it—and the Jovians have got them both. We'll have them in three days, and it ought to be fairly simple to dope out the opposite of a tractor, too—a pusher or presser beam. Say, round up the gang, will you, while I'm licking some of this stuff into shape for you to tear apart? Where are Venus and Mars? Um . . . m . . . m. Tell Alcantro and Fedanzo to come over here pronto—give 'em a special if necessary. We'll pick up Dol Kenor and Pyraz Amonar on the way—no, get them to Tellus, too. Then we'll get action quicker. Those four are all I want—get anybody else you want to come along."

His hands playing over the keys of an enormous calculating machine, Brandon was instantly immersed in a profound mathematico-physical problem; deaf and blind to everything about him. Westfall, knowing well that far-reaching results would follow Brandon's characteristic attack, sat down at the controls of the communicator. He first called Mars, the home planet of Alcantro and Fedanzo, the foremost force-field experts of three planets; and was assured in no uncertain terms that those rulers of rays were ready and anxious to follow wherever Brandon and Westfall might lead. Thence to Venus, where Dol Kenor, the electrical wizard

ard, and Pyraz Amonar, the master of mechanism, also readily agreed to accompany the expedition. He then called the General-in-Chief of the Interplanetary Police, requesting a detail of two hundred picked men for the hazardous venture. These most important calls out of the way, he was busy for over an hour giving long-distance instructions so that everything would be in readiness for the servicing of the immense space-cruiser the following Tuesday night.

Having guarded against everything his cautious and far-seeing mind could envisage, he went over to Brandon's desk and sat down, smoking contemplatively until the idea had been roughed out in mathematical terms.

"Here's the rough draft of the ray screen, Quince. We generate a blanket frequency, impressed upon the ultra carrier wave. That's old stuff, of course. Here's the novelty, in equation 59. With two fields of force, set up from data 27 to 43, it will be possible actually to project a pure force of such a nature that it will react to de-heterodyne the blanketing frequency at any pre-determined distance. That, of course, sets up a barrier against any frequency of the blanketed band. Incidentally, an extension of the same idea will enable us to see anywhere we want to look—calculate a retransmitting field."

"One thing at a time, please. That screen may be possible, but those fields will never generate it. Look at datum 31, in which your assumptions are unsound. In order to make any solution at all possible you have assumed cosine squared theta negligible. Mathematically, it is of course vanishingly small compared to the first power of the cosine, but fields of that type must be *exact*, and your neglect of the square is indefensible. Since you cannot integrate with the squared term in place, your whole solution fails."

"Not necessarily. We'll go back to 29, and put in sine squared theta minus one equal to z sub four. That gives us a cosversed sine in 30, and then we integrate. . ."

Thus the argument raged, and all the assistants whose work was not too pressing gathered around unobtrusively, for it was from just such fierce discussions as this that the ultra-radio and other epoch-making discoveries had come into being. Yard after yard of calculator paper was filled with equations and computations. Weirdly shaped curves were drawn, with arguments at every point—arguments hot and violent from Brandon, from Westfall cold and precise, backed by lightning calculations and with facts and diagrams culled from the many abstruse works of reference, which by this time literally covered the bench and overflowed upon the floor.

It was in this work that the strikingly different temperaments and abilities of the two scientists were revealed. Brandon never stood still, but walked around jerkily, chewing savagely the stem of an ancient and reeking pipe, gesticulating vigorously, the while his keen and agile mind was finding a way over, around, or through the apparently insuperable obstacles which beset their path; by means of mathematical and physical improvisations, which no one not inspired by sheer genius could have evolved. Westfall, seated quietly at the calculator, mercilessly shredded Brandon's theories to ribbons, pointing out their many flaws with his cold, incisive reasoning and with rapid calculations of the many factors involved. Then Brandon would find a remedy for each weakness in turn and, when Westfall

could no longer find a single flaw in the structure, they would toss the completed problem upon a table and attack the next one with unabated zeal. Brandon, in his light remark that the two made one real scientist, had far understated the case—those two brains, each so powerful and each so perfectly complementing the other, comprised the master-scientist who was to revolutionize science completely in a few short years.

To such good purpose did they labor that the calculations were practically finished by the time they reached the earth. There the ship was serviced with a celerity that spoke volumes for the importance of her mission—even the *Aldebaran*, the dazzlingly gold-plated queen of the fleet, waited unattended and disregarded on minus time while the entire force of the Interplanetary Corporation concentrated upon the battle-scarred old hulk of the *Sirius*. Brandon was surprised when he saw the two companies of police, but characteristically accepted without question the wisdom of any decision of his friend, and cordially greeted Inspector-General Crowninshield, only a year or so older than himself, but already in charge of a Division.

"Keen-looking bunch, Crown. Lot of different outfits—volunteers for special duty from the whole Tellurian force?"

"Yes. Everybody wanted to go, and there threatened to be trouble over the selection, so we picked the highest ratings from the whole Service. If there ever was such a thing as a picked force, we shall have it with us."

"What d'you mean, 'us'? You aren't going, are you?"

"Try to keep me from it! The names of all five of us I-G's were put in a hat, and I was lucky."

"Well, you may come in handy, at that," Brandon conceded. "And here's the big boss himself. Hi, Chief!"

"Ho, Brandon! Ho, Westfall!" Newton, Chairman of the Board of Directors of the IPC, shook hands with the two scientists. "Your Martians and Venerians are in Lounge Fifteen. I suppose that you have a lot of things to thrash out, so you may as well start now. Everything is being attended to—I'll take charge now."

"You going along, too?" asked Brandon.

"Going along, too? I'm *running* this cruise!" Newton declared. "I may take advice from you on some things and from Crowninshield on others, but I am in charge!"

"All x—i.e., at that," and Brandon and Westfall went to join their fellow-scientists in the designated room of the space-cruiser.

WHAT a contrast was there as the representatives of three worlds met! All six men were of the same original stock or of a similar evolution—science has not, even yet, decided the question definitely. Their minds were very much alike, but their respective environments had so variably developed their bodily structures that to outward seeming they had but little in common.

Through countless thousands of generations the Martians had become acclimated to a planet having little air, less water, and characterized by abrupt transitions from searing heat to bitter cold; from blinding light to almost impenetrable darkness. Eight feet tall and correspondingly massive, they could barely stand against the gravitational force of the Earth, almost three times as great as that of Mars, but the two Martian scientists struggled to their feet as the Terrestrials entered.



"As you were, fellows—lie down again and take it easy." Brandon suggested in the common Interplanetary tongue. "We'll be away from here very soon, then we can ease off."

"We greet our friends standing as long as we can stand," and, towering a full two feet above Brandon's own six-feet-two, Alcantro and Fedanzo in turn engulfed his comparatively tiny hand in a thick-shelled paw and lifted briefly the inner lids of quadruply-shielded eyes. For the Martian skin is not like ours. It is of incredible thickness; dry, pliable, rubbery, and utterly without sensation: heavily lined with fat and filled throughout its volume with tiny air-cells which make it an almost perfect non-conductor of heat and which prevent absolutely the evaporation of the precious moisture of the body. For the same reasons their huge and cat-like eyes are never exposed, but look through sealed, clear windows of membrane, over which may be drawn at will one or all of four pairs of lids—lids transparent, insensible, non-freezable, air-spaced insulators. Even the air they exhale carries from their bodies a minimum of the all-important heat and moisture, for the passages of their nostrils do not lead directly to the lungs, as do ours. They are merely the intakes for a tortuous system of tubes comprising a veritable heat-exchanger, so that the air finally expelled is in almost perfect equilibrium with the incoming supply in temperature and in moisture content. A grayish tan in color, naked and hairless—though now, out of deference to Terrestrial conventions, wearing light robes of silk—indifferent alike to any extreme of heat or cold, light or darkness: such were the two forbidding beings who arose to greet their Terrestrial friends, then again reclined.

"I suppose that you have been given to drink?" Westfall made sure that they had been tendered the highest hospitality of Mars.

"We have drunk full deeply, thanks; and it was not really necessary, for we drank scarcely three weeks ago."

Brandon and Westfall turned then and greeted the two Venerians, as different from the Martians as they were from the Terrestrials. Of earthly stature, form, and strength, yet each was encased in a space-suit stretched like a drum-head, and would live therein or in the special Venerian rooms of the vessel as long as the journey should endure. For the atmosphere of Venus is more than twice as dense as ours, is practically saturated with water-vapor, carries an extremely high concentration of carbon dioxide, and in their suits and rooms is held at a temperature of one hundred and ten degrees Fahrenheit. The lenses of their helmets were of heavy, yellowish-red composition, protecting their dead-white skins and red eyes from all actinic rays—for the Venerian lives upon the bottom of an everlasting sea of fog and his thin epidermis, utterly without pigmentation, burns and blisters as frightfully at the least exposure to actinic light as does ours at the touch of a red-hot iron.

Out in space at last, cruising idly with the acceleration set at a point bearable for the Martians, Westfall called the meeting to order and outlined the situation facing them. Brandon then handed around folios of papers, upon which the Venerians turned the invisible infra-red beams of the illuminators upon their helmets, thus flooding them with the "light" to which their retinas were most responsive.

"Here's the data," Brandon began. "As you see from Sheet 1, we can already draw any amount of power we shall need from cosmic radiation alone. . . ."

"Perpetual motion—ridiculous!" snapped from the sending disk upon the helmet of the master of mechanism.

"Not at all, Amonar," put in his fellow Venerian, "any more than a turbo-generator at the foot of a waterfall is perpetual motion. Those radiations originate we know not where, probably as a result of intra-atomic reactions. The fields of force of our hosts merely intercept these radiations, as a water-driven turbine intercepts the water. We merely use a portion of their energy before permitting them to go on, to we know not what end. Truly you have made a notable achievement in science, Tellurian friends, and we congratulate you upon its accomplishment. Please proceed."

"Upon the following sheets are described the forces employed by the Jovians, as we shall call them until we find out who or what they really are. We will discuss these forces later. For each force we have already calculated a screen, and we have also calculated various other forces of our own, with which we hope to arm ourselves before we reach Ganymede. The problems facing us are complex, since there are some nine thousand forcebands of the order in which we are working, each differing from all the others as much as torque differs from tension, or as much as red differs from green. Therefore we have appealed to you for help, knowing that we could do but little alone. Alcantro and Fedanzo will supervise the construction of the generators of the various fields from these calculations. Dol Kenor will correlate power and electricity to and with the fields. Westfall and I will help work out the theoretical difficulties as they arise. Pyraz Amonar, who can devise and build a machine to perform any conceivable mechanical task, will help us all in the many mechanical difficulties we shall certainly encounter. Discussion of any point is now in order."

**S**TEP by step and equation after equation the calculations and plans were gone over, until every detail was clear in each mind. Then the men bent to their tasks; behind them not only the extraordinarily complete facilities of that gigantic workshop which was the *Sirius*, but also the full power of the detachment of police—the very cream of the young manhood of the planet. Week after toilsome week the unrelenting labor went on, and little by little the massive cruiser of the void became endowed with an offensive and defensive armament incredible. An armament conceived in the fertile and daring brain of a sheer genius, guided only by the knowledge that such things were already in existence somewhere; reduced to working theory by a precise, mathematical logician; translated into fields of force by the greatest known experts; powered by the indefatigable efforts of an electrical wizard; made possible by the artful mechanical devices of the greatest inventor that three worlds had ever known! Thus it was that they approached Ganymede, ready, with blanketing screens full out, save for one narrow working band, and with a keen-eyed observer at every plate. When even the hyper-critical Westfall was convinced that their preparations were as complete as they could be made with the limited information at hand, Brandon directed a beam upon the satellite and tapped off a brief message:

stevens ganymede will arrive in about ten hours direct carrier beam toward sun we can detect it and will follow it to wherever you are sirius."

"ipv sirius," came the reply. "everything here. all x glad to see you thanks newton and stevens."

Brandon, at the controls, scanning his screens narrowly, dropped the vessel down to within a mile or two of the point of origin of Stevens' carrier beam without incident; then spoke to Westfall, at his side, with a grin.

"Nice layout the kid's got down there, Quince. It's too bad—don't look like we're going to get any action for our money a-tall. 'Sa shame, too—what's the use of wasting it, now that we've got it all made?"

"We are not done yet," cautioned Westfall, and even as he spoke an alarm bell burst into strident clamor—one of their far-flung detector screens was telling the world that it had encountered a dangerous frequency. The new ultra-lights flared instantly along the line automatically laid down by the detector, and upon the closely ruled micrometer screen of Brandon's desk, there glowed in natural color the image of a globular space-ship, approaching them with terrific speed.

"Men all stationed, of course, Crown?"

"Stationed and ready." Crowninshield, phones at his ears and microphone at his lips, was staring intently into his own plate.

"Kinda think I'll do most of it from here, but you can't always tell. If they get inside my guard you all know what to do."

"All x."

Expecting another such hollow victory as the other Hexan vessel had won over the defenseless *Arcturus*, the small stranger flashed nearer and nearer that huge and featureless football of armor steel. Within range, she launched her flaming plane of energy, but this time that Jovian sheet of force did not encounter unprotected and non-resisting steel. Upon the outer ray-screen, flaming white into incandescent defense, the furious bolt spent itself, and in the instant of the launching of the searing blade of flame, Brandon had gone into action. Switch after switch drove home, and one after another those frightful fields of force, those products of the mightiest minds of three planets, were hurled out against the tiny Jovian sphere. Driven as they were by the millions upon millions of horsepower stored in the accumulators of the *Sirius* they formed a coruscating spherical shell of intolerable energy all around the enemy vessel, but even their prodigious force was held at bay by the powerful defensive screens of the smaller space-ship. But attack the Jovian could not, every resource at her command being necessary to fend off the terrific counter-attack of her intended prey, and she turned in flight. Small and agile as she was, the enormous mass of the *Sirius* precluded any possibility of maneuvering with the Jovian, but Brandon had no intention of maneuvering. Rapid as the motions of the stranger were and frantic as was her dodging, the terrific forces of the tractor beams of the Interplanetary Vessel held her in an unbreakable grip, and although she dragged the massive *Sirius* hither and thither, she could not escape.

"Hm . . . m . . . m," mused Brandon. "We seem to be getting nowhere fast. How much power we using, Mac, and how much have we got coming in?"

"Output eighty-five thousand kilofranks," replied MacDonald, the first assistant. "Intake forty-nine thousand."

"Not so good—can't hold out forever at that rate. Shove out the receptor screens to the limit and drive 'em. They figure a top of sixty thousand, but we ought to pick up a little extra from that blaze out there. Drive 'em full out or up to sixty-five, whichever comes first. Can't seem to crush his screens, so I guess we'll have to try something else," and a thoughtful expression came over his face as he slowly extended his hand toward another switch, with a questioning glance at Westfall.

"Better not do that yet, Norman. Use that only as a last resort, after everything else has failed."

"Yeah—I'm scared to death of trying it, and it isn't necessary yet. He must have an open slit somewhere to work through, just as we have. I'll feel around for it a while."

"Is there any way of hetrodyning the new visiray upon the exploring frequency?"

"Hm . . . m . . . Never thought of that—it would be nice, too. . . . I think we can do it, too. Watch 'em, Quince, and holler if they start anything."

He abandoned his desk and established the necessary connections between the visiray apparatus and the controls of his board. There was a fierce violet-white glare from the plate as he closed the switch, and he leaped back with his hands over his eyes, temporarily blinded.

"Wow, that's hot stuff!" he exclaimed. "It works, all x, to the queen's taste," as he donned his heavy ray-goggles and resumed his place.

After making certain that the visiray was precisely synchronized and phased with the searching frequency, he built up the power of that beam until it was using twenty thousand kilofranks. Then, by delicately manipulating the variable condensers and inductances of his sensitive shunting relay circuits, he slowly shifted that frightful rod of energy from frequency to frequency, staring into the brilliant blankness of his micrometer screen as he did so. After a few minutes of search the screen darkened somewhat, revealing the image of the Jovian globe. Brandon instantly shifted into that one channel the entire power of his attack; steadying the controls to bring the sphere of the Jovians into the sharpest possible focus, knowing that he had found the open slit and that through it there was pouring upon the enemy the full power of his terrible weapon.

In the fraction of a second before the Jovians could detect the attack and close the slit, he saw a portion of the wall of their vessel flare into white heat and literally explode outward in puffs and gouts of flaming, molten metal and of incandescent gases. But the thrust, savage as it was, had not been fatal and the enemy countered instantly. Now that the crushing force of the full-coverage attack was lessened for a moment, through another slit there poured a beam of energy equal to the Terrestrials' own—a beam of such intense power that the outer screen of the *Sirius* flared from red through the spectrum, to and beyond the violet, and went black in less than a second, and the inner screen had almost gone down before Brandon's lightning hands could restore the complete coverage that so effectively blanketed the forces of the enemy.

"Well, we're back to the *status quo*," announced Brandon, calmly. "It's a good gag they didn't have time to locate our working slit—if they had pushed that stuff through our open channel, we'd have gotten frizzled up

some around the edges. As it was, we got the edge on that exchange—take it from your Uncle Dudley, Quince, that bird knows that he's been nudged!"

**A**GAIN he searched the entire band for an opening, but could find none. The enemy had apparently retired into a tightly closed shell of energy. The small vessel no longer struggled, nor even moved, but was merely resisting passively.

"Not an open channel, not even one for him to work through—he can't wiggle. Well, that won't get him anything. We're so much bigger than he is, that we can outlast him and will get him some time, since he's bound to run out of power before we do. I don't believe he can receive anything, sealed up as he is, and he can't have accumulators enough more efficient than ours to make up the difference, can he, Quince?"

"It is quite possible. For instance, although we have never heard of any progress being made along such lines, it has been pointed out repeatedly that synthesis of a radio-active element of very high atomic weight would theoretically yield an almost perfect accumulator—one many thousands of times as efficient as ours in mass-to-energy ratio. Then, too, you realize, of course, that there is a bare possibility that intra-atomic energy may not be absolutely impossible."

"Nix on that, Quince. I'll stand for a lot, but not for that last idea! It's hard to say that anything's impossible, of course, except things made so by definition or by being contrary to observational facts, but the best work shows that intra-atomic energy is just about as impossible as anything can well be. It has been shown pretty conclusively that all ordinary matter is already in its most stable state, so that work must be done upon any ordinary atom to decompose it. Besides, if he had either radioactive accumulators or intra-atomic energy, he would have cut us up long ago. Nope, the answer is that he's probably yelled for help and is trying to hold out until it gets here," was Brandon's rejoinder.

"What can we do about it?" asked Quince.

"Don't know yet. I do know, though, that we aren't half as ready for trouble as I thought we were. There's a dozen things I want to do that I can't because we haven't got the stuff. Don't say 'I told you so,' either—I know you did! You're the champion ground-and-lofty thinker of the century. Alcantro!"

"Here!"

"Round up the gang, will you, and figure me out a screen and a set of meters that will indicate an open band? We lose too much time feeling around anyhow, and we're too apt to take one on the chin while we're doing it. Also, you ought to make it so it'll shoot a jolt into the opening, while you're at it," said Brandon.

"We shall begin at once," and the massive Martian as he replied, stepped over to the calculating machine.

"Well, Quince, we can't do much to him this way—he's crawled into a hole and pulled the hole in after him. Gosh, I wish we had more stuff!"

"After all, we have everything whose necessity and practicability could have been foreseen in the light of our information. We can, of course, go further."

"You chirped it! But we can't let things ride this way or we'll get our hair singed. We'll have to decorate him with the grand slam, I guess."

"Yes, it seems as though the time for emergency measures has arrived."

"Put everything on the center of the band?"

"That is probably the best frequency to use in a case of this kind."

"He can't control, so we'll push him down close to the ground before we go to work on him—so we don't have so far to fall if anything goes screwy with the works. Here's hoping nothing gives away!"

The *Sirius*, almost against the flaming screens of the Jovian, and both vessels very close to the surface of the satellite, Brandon tested the power leads briefly, adjusted dials and coils, then touched the button which actuated the relays—relays which in turn drove home the gigantic switches that launched a fearsome and as yet untried weapon. Instantly released, the full seven hundred thousand kilofranks of their stupendous batteries of accumulators drove into the middle frequency of the attacking band, and Brandon's heart was in his mouth as he stared into the plate to see what would happen. He saw! Everything in the *Sirius* held fast, and under the impact of the inconceivable plane of force, the screens of the enemy vessel flared instantly into an even more intense incandescence and in that same fleeting instant went down, and all defenses vanished as the metal sphere fell apart into two halves, as would an apple under the full blow of a broad-axe.

Brandon quickly shut off his power and stared in relief into the central compartment of the globular ship of space, now laid open, and saw there figures, one or two of which were moving weakly. As he looked, one of these feebly attempted to raise a peculiar, tubular something toward a helplessly fettered body. Even as Brandon snatched away the threatening weapon with a beam of force, he recognized the captive.

"Great Cat, there's Breckenridge!" he gasped, and directed a lifting beam upon the bound and unconscious prisoner. Rapidly, but carefully, he was brought through the double airlock and into the control room, where his shackles were cut away and where he soon revived under vigorous and skilful treatment.

"Any more of you in there? Did I hit any of you with that beam?" demanded Brandon, intensely, as soon as Breckenridge showed signs of understanding.

"King's in there somewhere, and there's a Callistonian human being that you mustn't kill," the chief pilot replied, weakly and with great effort in every word. "Don't believe that you hit anybody direct, but the shock was pretty bad." Having delivered his message, he lay back, exhausted.

"All x. Crown, give me a squad. . . ."

"Not on your life!" barked the general. "This is my job and I'll do it myself. Your job is fighting the *Sirius*—stay with it!"

"Not in seven thousand years—I'm in on this, too," Brandon protested, but was decisively overruled by Newton.

"You belong right here at this board, since no one else can handle it the way you can. Stay here!" he commanded.

"All right," grudgingly assented the physicist, and held the *Sirius* upright, with her needle-sharp stern buried a few feet deep in the ground.

He watched the wreckage jealously while Crowninshield and forty helmeted men issued from the service door in the lower ultra-light compartment and advanced upon the two halves of the enemy vessel. As no hostile demonstrations ensued, scaling ladders were quickly

placed and with weapons at the alert the police boarded the hemispheres, manacled the still helpless beings visible, and, after laying down a fog of stupefying gas, vanished into compartments beyond the metal partitions. After a short time they reappeared and climbed down the scaling ladders, carrying several inert forms, and Brandon spoke into his transmitter.

"King all x, Crowninshield?"

"I think so. Not being in the control room he was not as badly shocked by the passage of the beam as were Breckenridge and those you saw. The things in the other rooms were about ready to fight, so we gave them a little whiff of tritylamin, but Captain King will be as good as ever in a few minutes."

"Fine business!" The police entered the *Sirius*, the service doors clanged shut, and Brandon turned to Westfall.

"While they're coming up, I guess I'll pick up Perce and Miss Newton. We'd better get them aboard and beat it, while we'll all in one piece!"

But even before he could send out the exploring beam of his communicator, the voice of Stevens came from the receiver.

"Hi, Brandon and Westfall! We've watched the whole show. Congratulations, fellows! Welcome to Ganymede! You are in our valley—we're upstream from you about three hundred meters; just below the falls, on the meadow side."

"All x," Brandon acknowledged. "We saw you. Come on out where we can pick you up. We've got to get away from here, and get away fast!"

"We'll carry off the pieces of that ship, too, Quince—we may be able to get a lot of pointers from it," and Brandon swung mighty tractor beams upon the severed halves of the Jovian vessel, then extended a couple of smaller rays to meet the two little figures racing across the smooth green meadow toward the *Sirius*.

## CHAPTER X

### Among Friends at Last

THE time for the landing of the *Sirius* was drawing near, and the castaways upon Ganymede had donned their only suits of earthly clothing, instead of the makeshifts of mole-skin, canvas, and leather they had been wearing so long. Thorns and underbrush had pierced and torn their once natty outing costumes, and sparks and flying drops of molten metal from Stevens' first crude forges had burned in them many gaping holes.

"I did the best I could with them, Steve, but they look pretty crummy," Nadia wrinkled her nose as she studied the anything but invisible seams, darns, and staring patches everywhere so evident, both in her own apparel of gray silk and in the heavy whipcord clothing of her companion.

"You did a great job, considering what you had to work with," he reassured her. "Besides, who cares about a few patches? I feel a lot more civilized in my own clothes, don't you?"

"Well . . . yes," she admitted. "They're silk, anyway, even if they don't look like much, and I'm just reveling in the feel of them next to me after the horrible, rough, scratchy things I've been wearing. See anything yet?"

"Not yet." Stevens had been scanning the heavens with a pair of binoculars. "That doesn't mean much, though, as they'll be just about in the sun and they'll be coming like a scared dog. Might as well put away these glasses—we probably won't be able to see them until they're right on top of us."

"What shall we take with us?"

"Don't know—nothing, probably, since they must have a campaign already mapped out. I'd like to salvage a lot of this junk, but I'm afraid we won't be able to. I'm going to take my bow and arrows, though, aren't you?"

"Absolutely! That's one thing that's better than anything I ever had on Earth. This bow of mine is perfect."

"There they are! Three rousing cheers! Say, but that old hulk looks good to me!"

"Doesn't she, though!" cried Nadia, vibrant with excitement. "You know, Steve. I've hardly dared really to believe it until this very minute. Oh look! That's that?"

The *Sirius* had stopped in midair and they could see, far in the distance, the tiny sphere of the Jovians, rushing to the attack.

"Oh, how horrible!" cried the girl, her voice breaking. "I'm afraid, Steve. . . ."

"You needn't be, ace. I've told you they won't go off half-cocked as long as Westfall is on the job. They're ready for anything, or they wouldn't be here—but just the same I wish that they had that Titanian mirror and a couple of those bombs!"

In a moment more the Jovian plane of force was launched, the powerful ray-screens flared into white-hot, sparkling defense, and the battle was on. Held spell-bound as the castaways were by that spectacular duel, yet Stevens' trained mind warned him of the perils of their position.

"Grab your bow and we'll beat it!" and he rapidly led her away from the steel structures to an open hillside, well away from any projection, tree, or sharp point of rock. "If that keeps up very long, we're going to see some real fireworks, and I don't know whether there will be enough left of our plant here to salvage or not. Everything is grounded, of course, but I don't believe that ordinary grounds will amount to much against what's coming."

"What are you talking about?" demanded Nadia.

"Look!" he replied, pointing, and as he spoke, a terrific bolt of lightning launched itself from the incandescent screen of the Jovian vessel upon their slender ultra-radio tower, which subsided instantly into a confused mass of molten and twisted metal.

AS the power of the beams was increased and as the combatants drew nearer and nearer the ground, the lightning display grew ever more violent. Well below the canyon as the warring vessels were, the power-plant and penstock did not suffer at all and only a few discharges struck the *Forlorn Hope*—discharges which were carried easily to ground by the enormous thickness of her armor—but every prominent object for hundreds of yards below the *Hope* was literally blasted out of existence. Radio tower, directors and fittings; trees, shrubs, sharp points of rock—all were struck again and again; fused, destroyed, utterly obliterated by the inconceivable energy being dissipated by those impregnable screens of force. Even almost flat upon the ground as the spectators were, each individual hair upon their



heads strove fiercely to stand erect, so heavily charged was the very air. Stevens' arm was blue for days, such was Nadia's grip upon it, and she herself could scarcely breathe in that mighty arm's constriction—but each was conscious only of that incredibly violent struggle, of that duel to the death being waged there before their eyes with those frightful weapons, hitherto unknown to man. They saw the *Sirius* triumphant, and Stevens led the dancing girl back into their dwelling of steel.

"Danger's all over now. Radio's gone, but we should fret a lot about that. It has done its stuff—we can use the communicators. And now, sweetheart, I'm going to kiss you—for the first time in seven lifetimes."

Locked in each other's arms, they watched the scene until Stevens thought it time to send his message. Then, running hand in hand toward the huge space-cruiser, they were snatched apart and drawn up toward the double airlocks of the main entrance. Pressure gradually brought up to normal, they were ushered into the control room, where Nadia glanced around quickly and almost took her father off his feet by her tempestuous rush into his arms.

"Oh, Daddy darling. I just knew you'd come along! I haven't seen you for a million years!" she exclaimed, rapturously. "And Bill, too—wonderful!" as she fervently embraced a young man wearing the uniform of a lieutenant of Interplanetary Police. "Ouch, Bill—you're breaking all my ribs!"

"Well, you cracked three of mine. Maybe you don't know how husky you are, but you've got a squeeze like a full grown boa constrictor!" He held her off at arms' length and studied her with admiration. "Gee, it's fine to see you again, Sis. You're looking great, too—I think I'll bring my girl out here to live. You always were a knockout, but now you're the loveliest thing I ever saw!"

He made his way through the group surrounding Stevens, while Nadia and her father talked earnestly.

"I'm Bill Newton. Thanks," he said, simply, holding out his hand, which was taken in a bone-crushing grip.

"Bring him over here, Bill!" Nadia called before Stevens could find a reply.

"I don't know how to say anything, Stevens," the officer continued, in embarrassment, as the two men turned to obey the summons. "She's a good kid, and we think a lot of her. We'd about given her up. We . . . She . . . Oh, rats, what's the use? You know what I mean. You're there, Stevens, like a . . ."

"Clam it, ace!" Stevens interrupted. "I get you, to nineteen decimals. And you don't half know just what a good kid she really is. She's the reason we're here—we were down pretty close to bed-rock for a while, she stood up when I wilted. She's got everything. She . . ."

"Clam it yourself, Steve! Don't believe a word of it, Dad and Bill. *Wilt!*" Nadia's voice dripped scorn. "Why, he di . . ."

"Please!" Newton's voice was somewhat husky as he silenced the clamor of the three young people, all talking at once. "I will not embarrass you further by trying to say something that no words can express. You told me that you would take care of her, and I learn that you have done so."

"I did what I could, but most of the credit belongs to her, no matter what she says," Stevens insisted. "Anyway, sir, here she is; alive, well and . . . unharmed," and

his eyes bore unflinchingly the piercing gaze of the older man, who was reassured and pleased by what he read therein. "One thing I want to say right now, though, that may make you feel like canceling the welcome. I loved Nadia even before the *Arcturus* was attacked, and since then, coming to know her as I have, the feeling hasn't lessened any."

"Nadia has already told me all about you two," said her father, "and the welcome stands. If you could take care of her as well as you have done since you left the *Arcturus*, I have no doubt of your ability to take care of her for life. We have been examining the work you have done here, son, and the more I saw of it the more amazed I became that you could have succeeded as you did. We are deeply indebted. . . . Just a minute! There's my call—I'm wanted in Fifteen. I'll see you again directly."

"Hi, Norm!" Stevens further relieved the surcharged atmosphere. "As soon as you and Quince can leave those controls come over and see us, will you?"

"All x—coming up!" sounded Brandon's deep and pleasant bass, and the two rescuers, who had tactfully avoided the family reunion, came over and greeted the third of their triumvirate.

"Ho, Perce—you look fit." Brandon ran an expert hand over Stevens' arm and shoulder. "Looks as if he might last a round or two, doesn't he, Quince?"

"You are looking fine, Steve. Neither of you appear any the worse for your experiences. So this is Nadia? We have heard of you, Miss Newton."

"I believe that, knowing Dad," she replied. "Thanks, both of you, for digging us out. I've heard about you two, and I'm going to kiss you both."

Westfall, the silent and reserved, was taken aback, but Brandon met her more than half-way.

"All x, Nadia—payment in full received and hereby acknowledged," he laughed, as he allowed her feet to return to the floor. "Even if it was some stout lads from Mars and Venus that did all the work we'll take the reward—especially since Alcantro and Fedanzo couldn't feel even such a high-voltage salute as that one was, and I can't picture you kissing a Venerian even if you could get to him. Whenever you get lost again, be sure to let us know, now that you've got our address. If I know Perce at all, you've heard of us 'til you're sick of it and us—it's a weakness of his—talking too much."

"Why, it's no such th . . ." began Nadia, but broke off as an aid came up and saluted smartly.

"Pardon me, but General Crowninshield requests that Doctor Brandon, Doctor Westfall, and Doctor Stevens join the council in Lounge Fifteen as soon as convenient." He saluted again and turned away.

"Yes, that's right, folks—we've got to take a lot of steps, fast—see you later," and Brandon, taking each of the other two by an arm, marched them away toward the designated assembly room.

THERE, already seated at a long table, were Czuv, King, and Breckenridge, all fully recovered, engaged in earnest conversation with Newton and Crowninshield. Alcantro and Fedanzo, the Martian scientists, were listening intently, as were the two Venerians Dol Kenor and Pyraz Amonar. The eyes of the three newcomers, however, did not linger upon the group at the table, but were irresistibly drawn to one corner of

the room, where six creatures lay in the heaviest manacles afforded by the stores of the Interplanetary Police. Not only were they manacled, but each was facing a ray-projector, held by a soldier whose expression showed plainly that he would rather press the lethal contact than not.

"Oh—those the things we're fighting?" Brandon stopped at the threshold and stared intently at the captive hexans. Goggling green eyes glaring venomously, they were lying quiet, but tense; mighty muscles ready to burst into berserk activity should the attention of a guard waver for a single instant.

But little more than half as large as the savage creatures with whom Stevens had fought in the mountain glade upon Ganymede, the hexans resembled those aborigines only as civilized men might resemble gigantic primordial savages of our own Earth. Brandon's gaze went from short, powerful legs up a round, red body to the enormous, freakish double pair of shoulders, with its peculiar universal jointing. From the double shoulders sprang four limbs, the front pair of which were undoubtedly arms, terminating in large, but fairly normal, hands. The intermediate limbs were longer than the legs and were much more powerful than the arms, and ended in members that were very evidently feet and hands combined. What in a human being would be the back of the hand was the sole of the foot—when walking upon that foot the long and dexterous thumb and fingers were curled up, out of the way and protected from injury, in the palm of the hand. From the monstrous shoulders there rose a rather long and very flexible, yet massive and columnar neck, supporting a head neither human nor bestial—a head utterly unknown to Terrestrial history or experience. The massive cranium bespoke a highly developed and intelligent brain, as did the three large and expressive, peculiar, triangular eyes. The three sensitive ears were very long, erect, and sharply pointed. Each was set immediately above an eye, one upon each side of the head and one in front. Each ear was independently and instantly movable in any direction, to catch the faintest sound. The head, like the body and limbs, was entirely devoid of hair. The horns, so prominent in the savages Stevens had seen, were in this highly intelligent race but vestigial—three small, sharp, black protuberances only an inch in length, one surmounting each ear, outlining the lofty forehead. The nose occupied almost the whole middle of the face and was not really a nose—it developed into a small and active proboscis. The chin was receding almost to the point of disappearance, so that the mouth, with its multiple rows of small, sharp, gleaming-white teeth, was almost hidden under the face instead of being a part of it. Such were the hexans, at whom the Big Three stared in undisguised amazement.

"Attention, please!" Newton called the meeting to order. "We have learned that all the passengers of the *Arcturus*, and all the crew save three, are alive and safe for the time being. Most of them are upon the satellite Europa. However, I understand that we are not yet sufficiently well armed to withstand such an attack in force as will certainly develop when we move to rescue them. This seems to be a war of applied physics—Doctor Brandon, as spokesman for the Scientific forces of the expedition, what are your suggestions?"

"Anticipating an attack in response to signals probably sent out by the enemy," replied Brandon. "I headed

directly south immediately. We are now well south of the ecliptic, and are traveling at considerably more than full Martian acceleration. Before making any suggestions, I should like to hear from Captain Czuv, who is more familiar than we are with the common enemy. Are they apt to follow us; can they detect us if we should drift at constant velocity; and can we search the brains of the prisoners with his Callistonian thought-exchanger, if he should build one with our help?"

"If they are close enough to us to overtake us without too much lost time, they will certainly attack us," Czuv answered at a nod from Newton. "Ordinarily they would pursue us to the limits of the Solar System if necessary, but since they have suffered reverses of late and cannot spare any vessels, they will probably not pursue us far. Yes, they can detect us, even without the driving rays, since this vessel uses much low-tension, low-frequency electricity in its automatic machinery, lights, and so on. No; our thought-transformer cannot take thoughts by force, and the hexans will exchange no ideas with us. They are implacable and deadly foes of all humanity, irrespective of planet or race. Mercy is to them unknown—they neither give nor take quarter."

"I can bear him out in that," Crowninshield interposed grimly. "The first one to recover snapped our ordinary handcuffs like so much thread and literally tore four men to pieces before the rest of us could ray him. Will you need me longer, Director Newton?"

"I think not, General. Captain Czuv, you have made no headway with them?" asked the Director.

"None whatever, as I foretold. They understand me thoroughly, since two of them speak my own tongue, but nothing that they have said can ever be repeated here. I knew from the first that all such attempts would be fruitless, but I have tried—and failed. I suggest what I suggested at first—put them to death, here and now, as they lie there, for most assuredly they will in some way contrive to take toll of lives of your own humanity if you allow them to live."

"You may be right," said Newton, "but neither the General nor myself can give the order for their death, since Interplanetary law does not countenance such summary action. However, the guards are fully warned of the peril, and will ray every prisoner at the first sign of unruliness. General Crowninshield, you may remove the prisoners and deal with them in accordance with . . ."

**PANDEMONIUM** reigned. At Crowninshield's signal for the guards to leave the room with their captives, all six had strained furiously at their bonds and three of them had broken free in a flash, throwing themselves upon the guards with unthinkable ferocity. Stevens, seeing a ray-projector in a hand of one of the prisoners, hurled his heavy chair instantly and with terrific force. The projector flew into the air, shattered and useless, while the hexan was knocked into a corner by the momentum of the massive projectile and lay there, stunned and broken. Brandon, likewise reacting instantaneously, had bent over and seized a leg of the table, bracing his knee against the corner. With a mighty lunge of his powerful body he wrenched out the support and with a continuation of the same motion, he brought the jagged oak head of his terrible club down full upon the crown of the second hexan, who had already torn one guard apart and was leaping toward Czuv, his hered-

itary foe. In midflight he was dashed to the floor, his head a shapeless, pulpy mass, and Brandon, bluegone again aloft, strode deeper into the fray. For a brief moment searing lethal beams probed here and there, chains clanked and snapped, once more that ponderous and irresistible oaken mace fell like the hammer of Thor, again spattering brains and blood abroad as it descended—then again came silence. The six erstwhile prisoners lay dead, but they had taken five of the guards with them—literally dismembered, hideously torn limb from limb by the superhuman, incredible physical strength and utter ferocity of the hexans.

By common consent the meeting was adjourned to another room, for the business in hand could not be postponed.

"Captain Czuv was right—we Tellurians could not believe in the existence of such a race without the evidence of our own senses." Newton reopened the meeting. "From this time on we take no prisoners. Doctor Brandon, you may resume."

"The detectors and lookouts will give ample warning of any attack, and Doctor Westfall has suggested that we should have all possible facts at hand before we try to decide upon a course of action. We should like to hear the full reports of Captain King, Captain Czuv, Chief Pilot Breckenridge, and Doctor Stevens."

The four men told their stories tersely and rapidly, while the others listened in deep attention. As the last speaker sat down, Newton again turned to Brandon, who silently jerked his head at Westfall, knowing his own inadequacy in such a situation—realizing that here was needed Westfall's cold and methodical thinking.

"Director Newton and gentlemen," Westfall spoke calmly and precisely. "We have much to do before we can meet the hexans upon equal terms. We have many new fields of force and rays to develop, of whose nature and necessity Doctor Brandon is already aware. Then, too, we must recalculate our visirays so that we can operate at greater range and efficiency. We must also examine the hexan space-ship which is towing, to do which it will be desirable to drift at constant velocity for a time. In it we may find instruments or devices as yet unknown to us. It also occurs to me that since this is an Interplanetary Police problem of the first magnitude, we should at once get in touch with Police Headquarters, so that the Peace Fleet can be armed as we ourselves are, or shall be, armed; for a large and highly efficient fleet will be necessary to do that which must be done. It is, of course, a foregone conclusion that Interplanetary humanity will support the humanity of Callisto against the hexans.

"It is also self-evident that we must stay here and rescue the Tellurians now upon Europa and Callisto, but we are not yet in position to decide just how that rescue is to be accomplished. Four courses are apparently open to us. First, to attempt it as soon as we shall have strengthened our armament as much as is now possible. That would invite a massed attack, and in my opinion would be foolish—probably suicidal. Second, to stand by at a distance until the rocket-ship is launched, then to escort it back to the Earth. Third, to aid the Callistionians as much as possible while awaiting the completion of the rocket-vessel. Fourth, and perhaps the most feasible and quickest, it may be possible for the Callistionian rocket-ships to bring out fellow-Tellurians, a few at a time, to us here out in space, since they are

apparently able to come and go at will. However, I would recommend that we make no plans for the rescue as yet—there is little use in attempting to deal with an ever-changing situation until we are ready to act forthwith. I suggest that we strengthen our offensive and defensive armament first, then secure information as to the exact status of affairs, both upon Callisto and upon Europa. Then, ready to act, we will do at once whatever seems called for by the situation then obtaining."

"The program as outlined seems eminently sensible. Are there any comments or suggestions?" None having been offered, Director Newton adjourned the meeting and each man attacked his particular problem.

True to Czuv's prediction the hexans did not deem it worth while to pursue the Terrestrial vessel, so obviously and so earnestly fleeing from them, and shortly, the acceleration was cut off, to render possible a thorough study of the two halves of the spherical warship of the enemy. Scientists donned space-suits and studied every feature of the strange vessel, while mechanics dismantled and transferred to the *Sirius* every device and instrument of interest. One or two novel and useful applications of rays and forces were found, their visirays and communicators in particular being of a high degree of efficiency; but upon the whole the science of the hexans was found to be inferior to that now known to the scientists of Interplanetary's flying laboratory. Brandon studied the hexan power-system most carefully, and, everything in readiness and after a long talk with Westfall, he called a general conference in the control-room.

"Gentlemen, we have done about everything we can do for the time being. By combining the best features of the visirays and communicators of the hexans with our own newly-perfected devices, we now have a really excellent system of communication. Our friends from Mars and Venus have so altered and enlarged our force-controls that our offensive and defensive fields, rays, and screens leave little to be desired. In power we are far ahead of the enemy. They apparently know nothing of the possibilities of cosmic radiation, but depend upon tight-beam transmission from their own power-plants—which transmission they have perfected to a point far beyond anything reached by us of the three planets. They do not use accumulators, and therefore their dissipation is limited to their maximum reception, which is about seventy thousand kilofranks. Since we can dissipate ten times that amount of energy, we could withstand, for a short time, the simultaneous attacks of ten of their vessels. Eleven or more of them, however, would be able to crush our defensive screens—and Captain Czuv has seen as many as a hundred of their space-ships in one formation. Furthermore, since they have several times our maximum acceleration, they could concentrate quickly upon any desired point. We could not escape them by flight if they really set out to overtake us, which they certainly will do if we again venture into their territory. Therefore it is clear that we cannot subject ourselves to any attack in force and it follows that we cannot do much of anything until the police fleet of some five hundred vessels can be re-armed and can join us near Callisto. This will require several months at best. As you already know, it has been decided that we should not return to any of the minor planets, as to do so might invite a hexan attack upon our police fleet which is as yet unprepared.

We are now heading for Uranus, in the hope that such a course will distract the attention of the hexans from Tellus, even though they probably already know that we are Tellurians. Our new communicator ray will reach any member of the Jovian system from this point. It has been decided that it is safe to use it, since it employs an almost absolutely tight beam of very small diameter, and since we know that that one hexan vessel, at least, had no apparatus sufficiently sensitive to detect a beam of that nature. We will therefore now get in touch with the Callistonians and with our own people."

BRANDON seated himself before the communicator screen, and while the others packed themselves closely around his stool, he snapped on the visiray and turned the dials which directed that invisible, immensely complex beam through space. The screen was apparently in itself a coign of vantage, flying through space with the velocity of light, and the watchers gasped involuntarily and drew themselves together, as with that unthinkable speed they flashed down toward the surface of Callisto. So realistic was the impression that they themselves were hurtling through the void, that they could scarcely reason themselves into believing their positive knowledge that the impending collision was not an actual happening! Reducing the velocity of the projection abruptly as it approached the satellite, Brandon flashed it down into a crater indicated by Czuv, and along a tunnel to the city of Zbardk, where the Callistonian captain held a long conversation with the Council of the nation. Frowning in thought, he turned to Newton and spoke seriously and slowly.

"Immediately after the loss of our super-plane, with the supposed death of King, Breckenridge, and myself, the other Tellurian officers were returned to Europa, since even they could be of no assistance to us Callistonians in our struggle against the new, high-acceleration vessels of the hexans. The present situation is much more serious than I would have believed possible. The last vessel going to visit Wruszk, our city upon Europa, was caught and destroyed by the hexans, and for many weeks no ship or message has come from there to Callisto. In spite of the fact that the hexan fleet is smaller than ever before, they are guarding Europa very closely. It is feared that they may have found and destroyed our city there—an expedition is even now about to set out in a desperate attempt to learn the fate of our fellows."

"Suppose the rays of the lifeboats were detected in landing?" asked Brandon. "That might have given them a clue."

"Possibly; but it is equally possible that our own men became careless in the operation of one of our own vessels. Having been unmolested so long, they might have relaxed their vigilance. We may never know."

"Tell 'em to cancel the expedition—we'll shoot the visiray over there right now and find out all about it. We'll let them know pretty quickly. Also, you might tell them that you've got complete plans and specifications for all the weapons that the hexans have, and a couple besides, and that the quicker they shoot a ship out here after you, the sooner they can get to building some stuff to blow those hexans clear out of space!"

It was the work of only a few moments to drive the visiray projection to Europa, where Czuv, to the great relief of all, found that the hexans had not yet dis-

covered either Wruszk or the Terrestrial workings. All European humanity, fully aware of the hexan investment, was exerting every possible precaution against discovery by the enemy. This information was duly flashed to the Council of Callisto, and the projection was then hurled across the intervening reaches of space and into the cavern in which was being built the enormous rocketship in which the Terrestrial refugees were to attempt the long voyage back to their own distant planet.

It took some little time to convince Doctor Penfield that there had been projected into the empty air of his little sanctum an absolutely invisible and impalpable structure of pure force capable of receiving and transmitting voice and vision. Once convinced of the reality of the phenomenon, however, the speaker beside Brandon's communicator screen fairly rattled under the fervor of his greeting, so great was his pleasure at the arrival of the expedition of relief and in knowing that King and Breckenridge, whom they had, of course, given up for dead, were aboard the Interplanetary vessel.

Penfield reported that the work upon the great rocketship was progressing satisfactorily, although slowly, since it was so much larger than any vessel theretofore constructed by the Callistonians. Newton, in turn, informed the autocrat of the stranded Terrestrials as to the *status quo* of the rescuing party.

"Of course, because of the hexan blockade, you cannot take us off until they have been wiped out, which will be several months at best," the surgeon said, slowly, and a shadow came over his face as he spoke. "Well, what can't be cured. . . ."

"Trouble with the personnel?" King broke in sharply. "Personnel, yes; but not trouble in the sense you mean—we have had none of that. It is only that there are four more of us now than there were. . . ."

"Huh? How come?" demanded Brandon, in astonishment.

"Four babies have been born to us here so far, and several more are coming. They are the ones I'm worried about. Most normal adults can stand it here without any serious effects, but this thin atmosphere and weak gravity are certain to result in abnormal development of children. However, there may be another way out of it. Are you using normal acceleration, or have you Martians aboard?"

"Both," replied Brandon. "We are carrying two inhabitants of Mars, but Alcantro and Ferdanzo are not ordinary Martians. They have been in constant training ever since we left Tellus, and now they can stand as high an acceleration as a weak Tellurian. We're riding at normal."

"Good! As you already know, there has been no communication of late between here and Callisto. It had already been decided, however, that one more voyage must be risked, in order to bring back material which is most urgently needed. Since the vessel will leave here light and is large enough to carry about thirty passengers on a short trip with some crowding, the Council will probably approve of having it carry some of our passengers out to the *Sirius*—especially now, since a vessel must visit you anyway, to get Captain Czuv and the specifications of the new armament. All these things can be done with one vessel in one trip."

"That sounds fine!" boomed King. "It will give me a chance to get back there where I belong, too. Whom are you sending out?"



"The seven couples who either have babies already or who will have them in the next few months; and some of our young who aren't standing the gaff any too well. You won't be in the red very deeply on the deal, either—while two or three of the passengers I am sending you will certainly be a nuisance; anybody could use, anywhere, such men as Commander Sanderson and Lieut. . ."

"Sanderson!" interrupted King. "Why, he wasn't—when did he get married?"

"The day after we arrived here," replied the surgeon. "His fiancée was aboard the *Arcturus*, and when they found out how long we would have to be here, they very sensibly decided not to wait."

"Were there any others?" demanded Nadia, who, standing between Stevens and her father, had been an interested listener.

"Plenty of them! Fourteen of our young women passengers have married here upon Europa. A few married fellow-passengers, but most of them picked out officers of the *Arcturus*. You'll find your staff made up pretty largely of benedicts now, King! We've been here a year, you know, and time will tell! Young Commander Sanderson's a fine baby—he'll be a credit to the IPC some day, if we can get him aboard the *Sirius*, where he can get a good start. We could give our babies normal air pressure here by building special rooms, but we cannot give them the normal acceleration necessary to develop their muscles properly."

"Well, we'd better snap over to Callisto and take this up with the Council," Brandon put in. "I don't imagine that there will be any objections, so you might as well get your ship gassed up and loaded—we'll be back here with the okay in about a minute and a half."

WITH Brandon at the controls and with Czuv at the communicator plate, the projection flashed toward distant Callisto and the group melted away, each man going about his interrupted task.

"Daddy, take us somewhere—I want to talk to you," Nadia spoke to her father, and the director led her and Stevens to his own room.

"All x, daughter; out with it!" and he bent upon her a quizzical glance, under which a fiery blush burned from her throat to her forehead.

"Dad, I've been thinking a lot since you rescued us, and what we've just heard has given me the nerve to say it. Steve, of course, wouldn't dare suggest such a thing until we're safely back on Earth, so I will." Her deep brown eyes held his steadily. "All those girls got married—why, some of them have babies already—and Steve and I have waited for each other so long, daddy! And none of them love each other the way we do. Do they, Steve?"

"I don't see how they could, sir; and that goes straight across the panel," and he bore unflinchingly the piercing gaze of the older man as his right arm encircled the girl and held her close.

"Well, why not?" A sudden smile transformed Newton's stern visage. "There are three chaplains with the police—a Methodist minister, a Catholic priest, and a Jewish rabbi. Also, we have on board two full-fledged I-P captains, either of whom is authorized to tie matrimonial knots. The means are not lacking—if you're both sure of yourselves?" and all levity disappeared as he studied the two young faces.

"Yes, you are sure," he continued after a moment, "just as her mother and I were—and are. It is too bad that she cannot be here with you, but it may be a long time before we can return to Tellus, and you have indeed waited long.

"Oh thanks, Daddy, you're just a perfectly wonderful old darling!" Nadia exclaimed, as she threw her arms rapturously around his neck. "And this isn't a warship at all—you know perfectly well that it's a research laboratory, and that as soon as the Navy gets here, you won't let it fight a bit more, because such scientists can't be allowed to risk themselves! And also, you're forgetting that whole flock of women and babies that are coming out here just as fast as they can get themselves ready. So get going, daddy old dear, and let's do things! Steve's a Quaker and we're Presbyterians, so none of the chaplains will do at all. Besides, I promised Captain King ages ago that he could marry me, so go get him and we'll do it now. Bill can be my bridesmaid, you'll give me away, and Steve can have the other two of his Big Three for best men. I'm off to hunt up the flimsiest, fussiest white dress I can find in my trunks. Let's go!"

"Mr. Newton." Stevens spoke thoughtfully as Nadia darted away. "You said something about her mother. I didn't want to say anything to raise false hopes while she was here, but I've got an idea. Let's meet in Brandon's room instead of here. We can send code to Tellus easily enough on our ultrawave, and we may be able to fake up something on vision."

A few minutes later the Big Three were in Brandon's private study; staring intently into a screen of ground glass upon which played flickering, flashing lights, while the black-haired physicist manipulated micrometer dials in infinitesimal arcs.

"Once more, Mac," Brandon directed. "Pretty nearly had them that time. We're stretching this projector about six hundred percent, but we've got to make this connection. Can't you give me just a little more voltage on those secondaries?"

"I can not!" the voice of the first assistant snapped from the speaker. "I'm overloading now so badly that some of my plates are getting hot—if I hold this voltage much longer, the whole secondary bank of tubes is going out. All x—you're on zero!"

"All x!" Flashing and waning, the lights upon the screen formed fleeting, shifting, nebulous images of a relay station upon distant Earth; but the utmost power of the transmitting fields could neither steady the image nor hold it.

"Back off, Mac," Brandon instructed. "I'm afraid we can't hold 'em direct—no use blowing a bank of tubes. We'll try relaying through Mars—we can hold them there, I think. It will muss up reception some, but it will probably be better than direct, at that. Point oh five three six . . . all x—shoot!"

Brandon's relay station upon Mars was finally raised and held, and a corps of keenly interested engineers there made short work of the Earth-Mars linkage. Soon the screen glowed with the picture of the transmitter-room of the Terrestrial station, and while the three men were waiting for Mrs. Newton to be called to her own television set, the door behind them opened. Nadia and her escorts entered the room—but Stevens' eyes saw only the entrancing vision of loveliness that was his bride. Dressed in a clinging white gown of shimmering

silk, her hair a golden blond corona, sweetly curved lips slightly parted and wide eyes eloquent, she paused momentarily as Stevens came to his feet and stared at her, his very heart in his eyes.

"You never saw me in a dress before—do you like me, Steve?"

"Like you! You're beautiful!" and gray eyes and brown, deep with wonder and with love, met and held as, unheeding the presence of their friends, they went into each other's arms in a coalescence as inevitable and as final as Fate itself.

"Hi, Nadia old dear!" and "Daughter, from what I can see of my son-in-law, I believe that he may do," came together from the speaker. Nadia tore herself from Stevens' embrace, to see upon the lambent screen the happily smiling faces of her mother and sister.

"Mother! Claire! Oh, you three wonder-workers!" She addressed simultaneously the distant Terrestrials and the scientists at her side, while broken exclamations, punctuated by ominous, crackling snaps, came from the laboring amplifier.

"Sorry to interrupt," MacDonald's voice broke in, "but you'll have to hurry it up. Alcantro and Fedanzo are doing their best, but every plate in my secondary bank's red hot, and you could fry an egg on any one of my transformers. Even my primary tubes are running hot. She won't hold together five minutes longer!"

Captain King opened his book, and in that small steel room, unadorned save for stack upon stack of book-cases, the brief but solemn ceremony joining two young lives was read—its solemnity only intensified by its unique accompaniment. For from Brandon at the primary controls, through the power-room of the *Sirius* and the relay-station upon Mars, to the immense Interplanetary transmitter upon Earth, the greatest radio and television engineers of two planets were fighting over-driven equipment, trying to hold an almost impossible connection, in order that Nadia Newton's mother and sister might be present at her wedding, hundreds of millions of miles distant in space!

"I pronounce you man and wife. Whom God hath joined, let no man put asunder." The sacred old ritual ended and Captain King picked up the bride in his great arms as though she were a baby, kissed her vigorously, and set her down in front of the transmitter. In the midst of the joyous confusion that ensued a tearing, rattling crash came from the speaker and the screen went blank.

"There!" lamented MacDonald from the power room. "I knew they'd blow! There goes my whole secondary bank—eight perfectly good ten-nineteens all shot to. . ."

"That's too bad, but it couldn't be helped; they went for a good cause," interrupted Brandon. "I'll come down and help clean up the mess."

LEAVING the bridal party, he made his way rapidly to the power room, where he found MacDonald and the two Martians inspecting the smoking remains of what had been the secondary bank of their powerful ultra-transmitter. Spare parts in abundance were on hand, and it was not long until the damaged section was apparently as good as new.

"Now to try her out," Brandon announced. "We want to give her a good workout, but there's no use trying the I-P stations any more—they're altogether too hard to handle at this range. Czuv said something about

an unknown race of monstrosities at the south pole of Jupiter—let's try it on them for a while."

He flung the field of force out into space, as responsive to his will as a well-trained horse, and guided it toward the southern limb of that gigantic world. Down and down the projection plunged, through mile after mile of reeking, steaming fog, impenetrable to earthly eyes. Finally it came to rest upon the surface, hundreds of feet deep in a lush, dank, tropical jungle, and Brandon plugged into the Venerian room.

"Kenor? We've got a lot of use for you, if you can come down here for a while. Thanks a lot." He turned to the Martians. "Luckily, we've got a couple of infra-red transformers aboard, so we won't have to build one. You fellows might break one out and shunt it onto this circuit while Dol Kenor is hunting up something for us to look at.

"Hi, old Infra-Eyes!" he went on, as the Venerian scientist waddled into the room in his bulging space-suit. "We've got something here that's right down your alley. Want to see what you can see?"

"Ah, a beautiful scene!" exclaimed Dol Kenor, after one glance into the plate. "It is indeed a relief, after all this coldness and glare, to see such a soft, warm landscape—even though I have never expected to behold quite such a violent bit of jungle," and under his guidance the projection flashed over hundreds of miles of territory. To the eyes of the Terrestrials the screen revealed only a blank, amorphous grayness, through which at times there shot lines and masses of vague and meaningless form; but the Venerian was very evidently seeing and enjoying many and diverse scenes.

"There, I think, is what you wish to see first," he announced, as he finally steadied the controls, and Brandon cut in upon the shunting screen the infra-red transformer. This device, developed long before to render possible the use of Terrestrial eyes in the opaque atmosphere of Venus, stepped up the fog-piercing long waves into the frequencies of light capable of affecting the earthly retina. Instantly the dull gray blank of the shunting screen became transformed into a clear and colorful picture of the great city of the Jovians of the South.

"Great Cat!" Brandon exclaimed. "Flying fortresses is right! They're in war formation, too, or I'm a polyp! We've got to watch this, Mac, all of it, and watch it close—it's apt to have a big bearing on what we'll have to do, before they get done. Better we rig up another set, and put a relay of observers on this job!"

## CHAPTER XI

### The Vorkul-Hexan War

VORKULIA, the city of the Vorkuls, was an immense seven-pointed star. At its center, directly upon the south pole of Jupiter, rose a tremendous shaft—its cross-section likewise a tapering seven-pointed star—which housed the directing intelligence of the nation. Radiating from the seven cardinal points of the building were short lanes leading to star-shaped open plots, from which in turn branched out ways to other stellate areas; ways reaching, after many such steps, to the towering inner walls of the metropolis. The outer walls, still loftier and even more massive ramparts of

sullen gray-green metal, formed a seamless, jointless barrier against an utterly indescribable foe; a barrier whose outer faces radiated constantly a searing, coruscating green emanation. Metal alone could not long have barred that voracious and implacably relentless enemy, but against that lethal green emanation even that ravening Jovian jungle could not prevail, but fell back, impotent. Writhing and crawling, loathesomely palpitant with an unspeakable exuberance of foul and repellent vigor, possible only to such meteorological conditions as obtained there, it threw its most hideously prolific growths against that radiant wall in vain.

The short, zig-zag lanes, the ways, and the seven-pointed areas were paved with a greenish glass. This pavement was intended solely to prevent vegetable growth and carried no traffic whatever, since few indeed of the Vorkuls have ever been earthbound and all traffic was in the air. The principal purpose of the openings was to separate, and thus to render accessible by air, the mighty buildings which, level upon level, towered upward, with airships hovering at or anchored to doorways and entrances at every level. Buildings, entrances, everything visible—all replicated, reiterated, repeated infinite variations in the one theme, that of the septenate stelliform.

Color ran riot; masses varied from immense blocks of awe-inspiring grandeur to delicate tracery of sheerest gossamer; lights flamed and flared in wide bands and in narrow, flashing pencils—but in all, through all, over all, and dominating all was the Seven-Pointed Star.

In and almost filling the space, at least a mile in width, between the inner and the outer walls were huge, seven-sided structures—featureless, squat, forbidding heptagons of dull green metal. No thing living was to be seen in that space. Its pavement was of solid metal and immensely thick, and that metal, as well as that of the walls, was burned and blackened and seared as though by numberless exposures to intolerable flame. In a lower compartment of one of these enormous heptagons Vortel Kromodeor, First Projector Officer, rested before a gigantic and complex instrument board. He was at ease—his huge wings folded, his sinuous length coiled comfortably in slack loops about two horizontal bars. But at least one enormous, extensible eye was always pointed toward the board, always was at least one nimble and bat-like ear cocked attentively in the direction of the signal panel.

A whistling, shrieking ululation rent the air and the officer's coils tightened as he reared a few feet of his length upright, shooting out half a dozen tentacular arms to various switches and controls upon his board, while throughout the great heptagon, hundreds of other Vorkuls sprang to attention at their assigned posts of duty. As the howling wall came to a climax in a blast of sound Kromodeor threw over a lever, as did every other projector officer in every other heptagon, and there was made plain to any observer the reason for the burns and scars in the tortured space between the lofty inner and outer walls of Vorkulia. For these heptagons were the monstrous flying fortresses which Czuv had occasionally seen from afar, as they went upon some unusual errand above the Jovian banks of mist, and which Brandon was soon to see in his visiray screen. The seared and disfigured metal of the pavement and walls was made so by the release of the furious blasts of energy necessary to raise those untold thousands of tons of

mass against the attraction of Jupiter, more than two and a half times the gravity of our own world! Vast volumes of flaming energy shrieked from the ports. Wave upon wave, flooding the heptagons, it dashed back and forth upon the heavy metal between the walls. As more and more of the inconceivable power of those Titanic generators was unleashed, it boiled forth in a devastating flood which, striking the walls, rebounded and leaped vertically far above even those mighty ramparts. Even the enormous thickness of the highly conducting metal could not absorb all the energy of that intolerable blast, and immediately beneath the ports new seven-pointed areas of disfigurement appeared as those terrific flying fortresses were finally wrenched from the ground and hurled upward.

HIGH in the air, another signal wailed up and down a peculiar scale of sound and the mighty host of vessels formed smoothly into symmetrical groups of seven. Each group then moved with mathematical precision into its allotted position in a complex geometrical formation—a gigantic, seven-ribbed, duplex cone in space. The flagship flew at the apex of this stupendous formation; behind, and protected by, the full power of the other floating citadels of the forty-nine groups of seven. Due north, the amazing armada sped in rigorous alignment, flying along a predetermined meridian—due north!

At the end of his watch Kromodeor relinquished his board to the officer relieving him and shot into the air, propelled by the straightening of the powerful coils of his snake-like body and tail. Wings half spread, lateral and vertical ruddering fins outthrust, he soared across the room toward a low opening. Just before they struck the wall upon either side of the doorway the great wings snapped shut, the fins retracted, and the long and heavy body struck the floor of the passage without a jar. With a wriggling, serpentine motion he sped like a vibrant arrow along the hall and into a wardroom. There, after a brief glance around the room, he coiled up beside a fellow officer who, with one eye, was negligently reading a scroll held in three or four hands; while with another eye, poised upon its slender pedicle, he watched a moving picture upon a television screen.

"Hello, Kromodeor," Wixill, Chief Power Officer\* greeted the newcomer in the wailing, hissing language of the Vorkuls. He tossed the scroll into the air, where it instantly rolled into a tight cylinder and shot into an opening in the wall of the room. "Glad to see you. Books and shows are all right on practice cruises, but I can't seem to work up much enthusiasm about such things now."

Kromodeor elevated an eye and studied the screen, upon which, to the accompaniment of whistling, shrieking sound, whirled and gyrated an interlacing group of serpentine forms.

"A good show, Wixill," the projector officer replied, "but nothing to hold the attention of men engaged in what we are doing. Think of it! After twenty years of preparation—two long lifetimes—and for the first time in our history, we are actually going to war!"

"I have thought of it at length. It is disgusting. Com-

\*In order to avoid all unnecessary strain upon the memory of the reader, all titles, etc., have been given in the closest possible English equivalent, instead of in an attempted transliteration of the foreign word. This particular officer has no counterpart upon Tellurian vessels. He is the second in command of a Vorkulian fortress, his function being to supervise all expenditure of power.—E. E. S.

pelled to traffic with an alien form of life! Were it not to end in the extinction of those unspeakable hexans, it would be futile to the point of silliness. I cannot understand them at all. There is ample room upon this planet for all of us. Our races combined are not using one seven-thousandth of its surface. You would think that they would shun all strangers. Yet for ages have they attacked us, refusing to let us alone, until finally they forced us to prepare means for their destruction. They seem as senselessly savage as the jungle growths, and, but for their very evident intelligence, one would class them as such. You would think that, being intelligent and being alien to us, they would not have anything to do with us in any way, peacefully or otherwise. However, their intrusions and depredations are about to end."

"They certainly are. Vorkulia has endured much—too much—but I am glad that our forefathers did not decide to exterminate them sooner. If they had, we could not have been doing this now."

"There speaks the rashness of youth, Kromodeor. It is a violation of all our instincts to have any commerce with outsiders, as you will learn as soon as you see one of them. Then, too, we will lose heavily. Since we have studied their armaments so long, and have subjected every phase of the situation to statistical analysis, it is certain that we are to succeed—but you also know at what cost."

"Two-sevenths of our force, with a probable error of one in seven," replied the younger Vorkul. "And because that figure cannot be improved within the next seven years and because of the exceptional weakness of the hexans due to their unexpectedly great losses upon Callisto, we are attacking at this time. Their spherical vessels are nothing, of course. It is in the reduction of the city that we will lose men and vessels. But at that, each of us has five chances in seven of returning, which is good enough odds—much better than we had in that last expedition into the jungle. But by the Mighty Seven, I shall make myself wrap around one hexan, for my brother's sake," and his coils tightened unconsciously. "Hideous, repulsive monstrosities! Creatures so horrible should not be allowed to live—they should have been tossed over the wall to the jungle ages ago!" Kromodeor curled out an eye as he spoke, and complacently surveyed the writhing cylinder of sinuous, supple power that was his own body.

"Better avoid contact work with them if possible," cautioned Wixill. "You might not be able to unwrap, and to touch one of them is almost unthinkable. Speaking of wrapping, you know that they are putting on the finals of the contact work in the star this evening. Let's watch them."

They slid to the floor and wriggled away in perfect "step"—undulating along in such nice synchronism that their adjacent sides, only a few inches apart, formed two waving rigidly parallel lines. Deep in the lower part of the fortress they entered a large assembly room, provided with a raised platform in the center and having hundreds of short, upright posts in lieu of chairs; most of which were already taken by spectators. The two officers curled their tails comfortably around two of the vacant pillars, elevated their heads to a convenient level of sight and directed each an eye or two upon the stage. This was, of course, heptagonal. Its sides, like those of the mighty flying forts themselves, were not straight,

but angled inward sufficiently to make the platform a seven-pointed star. The edge was outlined by a low rail, and bulwark and floor were padded with thick layers of a hard but smooth and yielding fabric.

IN this star-shaped ring two young Vorkuls were contending for the championship of the fleet in a contest that seemed to combine most of the features of wrestling, boxing, and bar-room brawling, with no holds barred. Four hands of each of the creatures held heavy leather billies, and could be used only in striking with those weapons, the remaining hands being left free to employ as the owner saw fit. Since the sport was not intended to be lethal, however, the eyes and other highly vulnerable parts were protected by metal masks, and the wing ribs were similarly guarded by leathern shields. The guiding fins, being comparatively small and extremely tough, required no protection.

"We're just in time," Kromodeor whistled. "The main bout is nicely on. See anyone from the flagship? I might stake a couple of korpels that Sintris will paint the symbol upon his wing."

"Most of their men seem to be across the star," Wixill replied, and both beings fell silent, absorbed in the struggle going on in the ring.

It was a contest well worth watching. Wing crashed against mighty wing and the lithe, hard bodies snapped and curled this way and that, almost faster than the eye could follow, in quest of advantageous holds. Above the shrieking wails of the crowd could be heard the smacks and thuds of the eight flying clubs as they struck against the leather shields or against tough and scaly hides. For minutes the conflict raged, with no advantage apparent. Now the fighters were flat upon the floor of the star, now dozens of feet in the air above it, as one or the other sought to gain a height from which to plunge downward upon his opponent; but both stayed upon or over the star—to leave its boundaries was to lose disgracefully.

Then, high in air, the visiting warrior thought that he saw an opening and grappled. Wings crashed in fierce blows, hands gripped and furiously wrenched. Two powerful bodies, tapering smoothly down to equally powerful tails, corkscrewed around each other viciously, winding up into something resembling tightly twisted lamp cord; and the two Vorkuls, each helpless, fell to the mat with a crash. Fast as was Zerexi, the gladiator from the flagship, Sintris was the merest trifle faster. Like the straightening of a twisted spring of tempered steel that long body uncoiled as they struck the floor, and up under those shielding wings—an infinitesimal fraction of a second slow in interposing—that lithe tail sped. Two lightning loops flashed around the neck of the visitor and tightened inexorably. Desperately the victim fought to break that terrible strangle hold, but every maneuver was countered as soon as it was begun. Beating wings, under whose frightful blows the very air quivered, were met and parried by wings equally capable. Hands and clubs were of no avail against that corded cable of sinew, and Sintris, his head retracted between his wings and his own hands reinforcing that impregnable covering over his head and neck, threw all his power into his tail—tightening, with terrific, rippling surges, that already throttling band about the throat of his opponent. Only one result was possible. Soon Zerexi lay quiet, and a violet beam of light flared from a torch



at the ringside, bathing both contenders. At the flash the winner disengaged himself from the loser, and stood by until the latter had recovered the use of his paralyzed muscles. The two combatants then touched wing tips in salute and flew away together, over the heads of the crowd; plunging into a doorway and disappearing as the two officers uncoiled from their "seats" and wriggled out into the corridor.

"Fine piece of contact work," said Wixill, thoughtfully. "I'm glad that Sintris won, but I did not expect him to win so easily. Zerexi shouldn't have gone into a knot so early against such a fast man."

"Oh, I don't know," argued Kromodeor. "His big mistake was in that second body check. If he had blocked the sixth arm with his fifth, taken out the fourth and second with his third, and then gone in with . . ." and so, quite like two early experts after a good boxing match, the friends argued the fine points of the contest long after they had reached their quarters.

Day after day the vast duplex cone of Vorkulian fortresses sped toward the north pole of the great planet, with a high and constant velocity. Day after day the complex geometrical figure in space remained unchanged, no unit deviating measurably from its precise place in the formation. Over rapacious jungles, over geysers spouting hot water, over sullenly steaming rivers and seas, over boiling lakes of mud, and high over gigantic volcanoes, in uninterrupted eruptions of cataclysmic violence, the Vorkulian phalanx flew—straight north. The equatorial regions, considerably hotter than the poles, were traversed with practically no change in scenery—it was a world of steaming fog, of jungle, of hot water, of boiling, spurting mud, and of volcanoes. Not of such mild and sporadic volcanic outbursts as we of green Terra know, but of gigantic primordial volcanoes, in terrifyingly continuous performances of frightful intensity. Due north the Vorkulian spearhead was hurled, before the rigorous geometrical alignment was altered.

"All captains, attention!" Finally, in a high latitude, the flagship sent out final instructions. "The hexans have detected us and our long range observers report that they are coming to meet us in force. We will now go into the whirl, and proceed with the maneuvers exactly as they have been planned. Whirl!"

At the command, each vessel began to pursue a tortuous spiral path. Each group of seven circled slowly about its own axis, as though each structure were attached rigidly to a radius rod, and at the same time spiraled around the line of advance in such fashion that the whole gigantic cone, wide open maw to the fore, seemed to be boring its way through the air.

"Lucky again!" Kromodeor, in the wardroom, turned to Wixill as the two prepared to take their respective watches. "It looks as though the first action would come while we're on duty. I've got just one favor to ask, if you have to economize on power, let Number One alone, will you?"

"No fear of that," Wixill hissed, with the Vorkulian equivalent of a chuckle. "We have abundance of power for all of your projector officers. But don't waste any of it, or I'll cut you down five ratings!"

"You're welcome. When I shine old Number One on any hexan work, one flash is all we'll take. See you at supper," and, leaving his superior at the door of the power room, Kromodeor wriggled away to his station upon the parallel horizontal bars before his panel.

Making sure that his tail coils were so firmly clamped that no possible lurch or shock could throw him out of position, he set an eye toward each of his sighting screens, even though he knew that it would be long before those comparatively short range instruments would show anything except friendly vessels. Then, ready for any emergency, he scanned his one "live" screen—the one upon which were being flashed the pictures and reports secured by the high-powered instruments of the observers.

WITH the terrific acceleration employed by the hexan spheres, it was not long until the leading squadron of fighting globes neared the Vorkulian war-cone. This advance guard was composed of the new, high-acceleration vessels. Their crews, with the innate blood-lust and savagery of their breed, had not even entertained the thought of accommodating their swifter pace to that of the main body of the fleet. These vast, slow-moving structures were no more to be feared than those similar ones whose visits they had been repulsing for twenty long Jovian years—by the time the slower spheres could arrive upon the scene there would be nothing left for them to do. Therefore, few in number as were the vessels of the vanguard, they rushed to the attack. In one blinding salvo they launched their supposedly irresistible planes of force—dazzling, scintillating planes under whose fierce power the studying, questing, scouting fortresses previously encountered had fled back southward; cut, beaten, and crippled. These spiraling monsters, however, did not pause or waver in their stolidly ordered motion. As the hexan planes of force flashed out, the dull green metal walls broke into a sparkling green radiance, against which the Titanic bolts spent themselves in vain. Then there leaped out from the weird brilliance of the walls of the fortresses great shafts of pale green luminescence—tractor ray after gigantic tractor ray, which seized upon the hexan spheres and drew them ruthlessly into the yawning open end of that gigantic cone.

Then, in each group of seven, similar great streamers of energy reached out from fortress to fortress, until each group was welded into one mighty unit by twenty-one such bands of force. The unit formed, a ray from each of its seven component structures seized upon a designated sphere, and under the combined power of those seven tractors, the luckless globe was literally snapped into the center of mass of the Vorkulian unit. There seven dully gleaming red pressor rays leaped upon it, backed by all the power of seven gigantic fortresses, held rigidly in formation by the unimaginable mass of the structures and by their twenty-one prodigious tractor beams. Under that awful impact, the screens and walls of the hexan spheres were exactly as effective as so many structures of the most tenuous vapor. The red glare of the vortex of those beams was lightened momentarily by a flash of brighter color, and through the foggy atmosphere there may have flamed briefly a drop or two of metal that was only liquefied. The red and green beams snapped out, the peculiar radiance died from the metal walls, and the gigantic duplex cone of the Vorkuls bored serenely northward—as little marked or affected by the episode as is a darting swift who, having snapped up a chance insect in full flight, darts on.

"Great Cat!" Far off in space, Brandon turned from

his visiray screen and wiped his brow. "Czuv certainly chirped it, Perce, when he called those things flying fortresses. But who, what, why, and how? We didn't see any apparatus that looked capable of generating or handling those beams—and of course, when they got started, their screens cut us off at the pockets. Wish we could have made some sense out of their language—like to know a few of their ideas—find out whether we can't get on terms with them some way or other. Funny-looking wampuses, but they've got real brains—their think-tanks are very evidently full of bubbles. If they have it in mind to take us on next, old son, it'll be just . . . too . . . bad!"

"And then some," agreed Stevens. "They've got something—no fooling. It looks like the hexans are going to get their, good and plenty, pretty soon—and then what? I'd give my left lung and four front teeth for one long look at their controls in action."

"You and me both—it's funny, the way those green ray-screens stick to the walls, instead of being spherical, as you'd expect . . . should think they'd *have* to radiate from a center, and so be spherical." Brandon cogitated. "However, we've got nothing corkscrew enough to go through them, so we'll have to stand by. We'll stay inside whenever possible, look on from outside when we must, but all the time picking up whatever information we can. In the meantime, now that we've got our passengers, old Doctor Westfall prescribes something that he says is good for what ails us. Distance—lots of distance, straight out from the sun—and I wouldn't wonder if we'd better take his prescription."

The two Terrestrial observers relapsed into silence, staring into their visiray plates, searching throughout the enormous volume of one of those great fortresses in another attempt to solve the mystery of the generation and propagation of the incredible manifestations of energy which they had just witnessed. Scarcely had the search begun, however, when the visirays were again cut off sharply—the rapidly advancing main fleet of the hexans had arrived and the scintillant Vorkulian screens were again in place.

True to hexan nature, training and tradition, the fleet, hundreds strong, rushed savagely to the attack. Above, below, and around the far-flung cone the furious globes dashed, attacking every Vorkulian craft viciously with every resource at their command; with every weapon known to their diabolically destructive race. Planes of force stabbed and slashed, concentrated beams of annihilation flared fiercely through the reeking atmosphere, gigantic aerial bombs and torpedoes were hurled with full radio control against the unwelcome visitor—with no effect. Bound together in groups of seven by the mighty, pale-green bands of force, the Vorkulian units sailed calmly northward, spiraling along with not the slightest change in formation or velocity. The frightful planes and beams of immeasurable power simply spent themselves harmlessly against those sparkingly radiant green walls—seemingly as absorbent to energy as a sponge is to water, since the eye could not detect any change in the appearance of the screens, under even the fiercest blasts of the hexan projectors. Bombs, torpedoes, and all material projectiles were equally futile—they exploded harmlessly in the air far from their objectives, or disappeared at the touch of one of those dark, dull-red pressor rays. And swiftly, but calmly and methodically as at a Vorkulian practice drill,

the heptagons were destroying the hexan fleet. Seven mighty green tractors would lash out, seize an attacking sphere, and snap it into the center of mass of the unit of seven. There would be a brief flash of dull red, a still briefer flare of incandescence, and the impalpable magnets would leap out to seize another of the doomed globes. It was only a matter of moments until not a hexan vessel remained; and the Vorkulian juggernaut spiraled onward, now at full acceleration, toward the hexan stronghold dimly visible far ahead of them—a vast city built around Jupiter's northern pole.

At the controls of his projector, Kromodeor spun a dial with a many-fingered, flexible hand and spoke.

"Wixill, I am being watched again—I can feel very plainly that strange intelligence watching everything I do. Have the tracers located him?"

"No, they haven't been able to synchronize with his wave yet. Either he is using a most minute pencil or, what is more probable, he is on a frequency which we do not ordinarily use. However, I agree with you that it is not a malignant intelligence. All of us have felt it, and none of us senses enmity. Therefore it is not a hexan—it may be one of those strange creatures of the satellites, who are, of course, perfectly harmless."

"Harmless, but unpleasant," returned Kromodeor. "When we get back I'm going to find his beam myself and send a discharge along it that will end his spying upon me. I do not. . . ."

A WAILING signal interrupted the conversation and every Vorkul in the vast fleet coiled even more tightly about his bars, for the real battle was about to begin. The city of the hexans lay before them, all her gigantic forces mustered to repel the first real invasion of her long and warlike history. Mile after mile it extended, an orderly labyrinth of spherical buildings arranged in vast interlocking series of concentric circles—a city of such size that only a small part of it was visible, even to the infra-red vision of the Vorkulians. Apparently the city was unprotected, having not even a wall. Outward from the low, rounded houses of the city's edge there reached a wide and verdant plain, which was separated from the jungle by a narrow moat of shimmering liquid—a liquid of such dire potency that across it, even those frightful growths could neither leap nor creep.

But as the Vorkulian phalanx approached—now shooting forward and upward with maximum acceleration, screaming bolts of energy flaming out for miles behind each heptagon as the full power of its generators was unleashed—it was made clear that the homeland of the hexans was far from unprotected. The verdant plain disappeared in a blast of radiance, revealing a transparent surface, through which could be seen masses of machinery filling level below level, deep into the ground as far as the eye could reach; and from the bright liquid of the girdling moat there shot vertically upward a coruscantly refulgent band of intense yellow luminescence. These were the hexan defences, heretofore invulnerable and invincible. Against them any ordinary warcraft, equipped with ordinary weapons of offense, would have been as pitifully impotent as a naked baby attacking a battleship. But now those defenses were being challenged by no ordinary craft, it had taken the mightiest intellects of Vorkulia two long lifetimes to evolve the awful engine of destruction which

was hurling itself forward and upward with an already terrific and constantly increasing speed.

Onward and upward flashed the gigantic duplex cone, its entire whirling mass laced and latticed together—into one mammoth unit by green tractor beams and red pressors. These tension and compression members, of unheard-of power, made of the whole fleet of three hundred forty-three fortresses a single stupendous structure—a structure with all the strength and symmetry of a cantilever truss! Straight through that wall of yellow vibrations the vast truss drove, green walls flaming blue defiance as the absorbers overloaded; its doubly braced tip rearing upward, into and beyond the vertical as it shot through that searing yellow wall. Simultaneously from each heptagon there flamed downward a green shaft of radiance, so that the whole immense circle of the cone's mouth was one solid tractor beam, fastening upon and holding in an unbreakable grip mile upon mile of the hexan earthworks.

Practically irresistible force and supposedly immovable object! Every loose article in every heptagon had long since been stored in its individual shockproof compartment, and now every Vorkul coiled his entire body in fierce clasp about mighty horizontal bars: for the entire kinetic energy of the untold millions of tons of mass comprising the cone, at the terrific measure of its highest possible velocity, was to be hurled upon those unbreakable linkages of force which bound the trussed aggregation of Vorkulian fortresses to the deeply buried intrenchments of the hexans. The gigantic composite tractor beam snapped on and held. Inconceivably powerful as that beam was, it stretched a trifle under the incomprehensible momentum of those prodigious masses of metal, almost halted in their terrific flight. But the war-cone was not quite halted; the calculations of the Vorkulian scientists had been accurate. No possible artificial structure, and but few natural ones—in practice maneuvers entire mountains had been lifted and hurled for miles through the air—could have withstood the incredible violence of that lunging, twisting, upheaving impact. Lifted bodily by that impalpable hawser of force and cruelly wrenched and twisted by its enormous couple of angular momentum, the hexan works came up out of the ground as a waterpipe comes up in the teeth of a power shovel. The ground trembled and rocked and boulders, fragments of concrete masonry, and masses of metal flew in all directions as that city-encircling conduit of diabolical machinery was torn from its bed.

A PORTION of that conduit fully thirty miles in length was in the air, a twisted, flaming inferno of wrecked generators, exploding ammunition, and broken and short-circuited high-tension leads before the hexans could themselves cut it and thus save the remainder of their fortifications. With resounding crashes, the structure parted at the weakened points, the furious upheaval stopped and, the tractor beams shut off, the shattered, smoking, erupting mass of wreckage fell in clashing, grinding ruin upon the city.

The enormous duplex cone of the Vorkuls did not attempt to repeat the maneuver, but divided into two single cones, one of which darted toward each point of rupture. There, upon the broken and unprotected ends of the hexan cordon, their points of attack lay: theirs the task to eat along that annular fortress, no matter what the opposition might bring to bear—to channel in its place

a furrow of devastation until the two cones, their work complete, should meet at the opposite edge of the city. Then what was left of the cones would separate into individual heptagons, which would so systematically blast every hexan thing into nothingness as to make certain that never again would they resume their insensate attacks upon the Vorkuls. Having counted the cost and being grimly ready to pay it, the implacable attackers hurled themselves upon their objectives.

Here were no feeble spheres of space, commanding only the limited energies transmitted to their small receptors through the ether. Instead there were all the offensive and defensive weapons developed by hundreds of generations of warrior-scientists; wielding all the incalculable power capable of being produced by the massed generators of a mighty nation. But for the breach opened in the circle by the irresistible surprise attack, they would have been invulnerable, and, hampered as they were by the defenseless ends of what should have been an endless ring, the hexans took heavy toll.

The heptagons, massive and solidly braced as they were, and anchored by tractor rays as well, shuddered and trembled throughout their mighty frames under the impact of fiercely driven pressor beams. Sullenly radiant green wall-screens flared brighter and brighter as the Vorkulian absorbers and dissipators, mighty as they were, continued more and more to overload; for there were being directed against them beams from the entire remaining circumference of the stronghold. Every deadly frequency and emanation known to the fiendish hexan intellect, backed by the full power of the city, was poured out against the invaders in sizzling shrieking bars, bands, and planes of frenzied incandescence. Nor was vibratory destruction alone. Armor-piercing projectiles of enormous size and weight were hurled—diamond-hard, drill-headed projectiles which clung and bored upon impact. High-explosive shells, canisters of gas, and the frightful aerial bombs and radio-dirigible torpedoes of highly scientific war—all were thrown with lavish hand, as fast as the projectors could be served. But thrust for thrust, ray for ray, projectile for massive projectile, the Brobdingnagian creations of the Vorkuls gave back to the hexans.

The material lining of the ghastly moat was the only substance capable of resisting the action of its contents, and now, that lining destroyed by the uprooting of the fortress, that corrosive, brilliantly mobile liquid cascaded down in to the trough and added its hellish contribution to the furious scene. For whatever that devouring fluid touched flared into yellow flame, gave off clouds of lurid, strangling vapor, and disappeared. But through yellow haze, through blasting frequencies, through clouds of poisonous gas, through rain of metal and through storm of explosive the two cones ground implacably onward, their every offensive weapon centered upon the fast-receding exposed ends of the hexan fortress. Their bombs and torpedoes ripped and tore into the structure beneath the invulnerable shield and exploded, demolishing and hurling aside like straws, the walls, projectors, hexads and vast mountains of earth. Their terrible rays bored in, softening, fusing, volatilizing metal, short-circuiting connections, destroying life far ahead of the point of attack; and, drawn along by the relentlessly creeping composite tractor beam, there progressed around the circumference of the hexan city two veritable Saturnalia of destruction—uninterrupted,

cataclysmic detonations of sound and sizzling, shrieking, multi-colored displays of pyrotechnic incandescence combining to form a spectacle of violence incredible.

But the heptagons could not absorb nor radiate indefinitely those torrents of energy, and soon one greenish incandescent screen went down. Giant shells pierced the green metal walls, giant beams of force fused and consumed them. Faster and faster the huge heptagon became a shapeless, flowing mass, its metal dripping away in flaming gouts of brilliance; then it disappeared utterly in one terrific blast as some probing enemy ray reached a vital part. The cone did not pause nor waver. Many of its component units would go down, but it would go on—and on and on until every hexan trace had disappeared or until the last Vorkulian heptagon had been annihilated.

In one of the lowermost heptagons, one bearing the full brunt of the hexan armament, Kromodeor reared upright as his projector controls went dead beneath his hands. Finding his communicator screens likewise lifeless, he slipped to the floor and wriggled to the room of the Chief Power Officer, where he found Wixill idly fingering his controls.

"Are we out?" asked Kromodeor, tersely.

"All done," the Chief Power Officer calmly replied. "We have power left, but we cannot use it, as they have crushed our screens and are fusing our outer walls. Two out of seven chances, and we drew one of them. We are still working on the infra band, over across on the Second's board, but we won't last long. . . ."

AS he spoke, the mighty fabric lurched under them, and only their quick and powerful tails, darting in lightning loops about the bars, saved them from being battered to death against the walls as the heptagon was hurled end over end by a stupendous force. With a splintering crash it came to rest upon the ground.

"I wonder how that happened? They should have rayed us out or exploded us," Kromodeor pondered. The Vorkuls, with their inhumanly powerful, sinuous bodies, were scarcely affected by the shock of that frightful fall.

"They must have had a whole battery of pressors on us when our greens went out—they threw us half-way across the city, almost into the gate we made first," Wixill replied, studying the situation of the vessel in the one small screen still in action. "We aren't hurt very badly—only a few holes that they are starting to weld already. When the absorber and dissipator crews get them cooled down enough so that we can use power again, we'll go back."

But they were not to resume their place in the attack. Through the holes in the still-glowing walls, hexan soldiery were leaping in steady streams, fighting with the utmost savagery of their bloodthirsty natures, urged on by the desperation born of the knowledge of imminent defeat and total destruction. Hand-weapons roared, flashed, and sparkled; heavy bars crashed and thudded against crunching bones; mighty bodies and tails whipped crushingly about six-limbed forms which wrenched and tore with monstrously powerful hands and claws. Fiercely and valiantly the Vorkuls fought, but they were outnumbered by hundreds and only one outcome was possible.

Kromodeor was one of the last to go down. Weapons long since exhausted, he unwrapped his deadly coils from about a dead hexan and darted toward a storeroom, only to be cut off by a horde of enemies. Throwing himself

down a vertical shaft, he flew toward a tiny projector-locker in the lowermost part of one of the great star's points, the hexans in hot pursuit. He wrenched the door open, and even while searing planes of force were riddling his body, he trained the frightful weapon he had sought. He pressed the contact, and bursts of intolerable flame swept the entire passage clear of life. Weakly he struggled to go out into the aisle, but his muscles refused to do the bidding of his will and he lay there, twitching feebly.

In the power room of the heptagon a hexan officer turned fiercely to another, who was offering advice.

"Vorkuls? Bah!" he snarled, viciously. "Our race is finished. Die we must, but we shall take with us the one enemy, who above all others needs destruction!" and he hurled the captured Vorkulian fortress into the air.

As the heptagon lurched upward, the massive door of a lower projector locker clanged shut and Kromodeor collapsed in a corner, his consciousness blotted out.

"WELL, that certainly tears it! That's a . . . I . . ." Stevens' ready vocabulary failed him and he turned to Brandon, who was still staring narrow-eyed into the plate, watching the destruction of the hexan city.

"They've got something, all right—you've got to hand it to them," Brandon replied. "And we thought we knew something about forces and physical phenomena in general. Those birds have forgotten more than we ever will know. Just one of those things could take the whole I-P fleet, armed as we are now, any morning before breakfast, just for setting-up exercises. We've got to do something about it—but what?"

"It's okay—whatever you say. There may be an out somewhere, but I don't see it," and Stevens' gloomy tone matched his words.

Highly trained scientists both, they had been watching that which transcended all the science of the inner planets and knew themselves outclassed immeasurably.

"Only one thing to do, as I see it," Brandon cogitated. "That's to keep on going straight out, the way we're headed now. We'd better call a council of war, to dope out a line of action."

## CHAPTER XII

### The Citadel in Space

FOR the first time in many days Brandon and Westfall sat at dinner in the main dining room of the *Sirius*. They were enjoying greatly the unaccustomed pleasure of a leisurely, formal meal; but still their talk concerned the projection of pure forces instead of subjects more appropriate to the table; still their eyes paid more attention to diagrams drawn upon scraps of paper than to the diners about them.

"But I tell you, Quince, you're full of little red ants, clear to the neck!" Brandon snorted, as Westfall waved one of his arguments aside. "You must have had help to get that far off—no one man could possibly be as wrong as you are. Why, those fields absolutely will. . . ."

"Hi, Quincey! Hi, Norman!" a merry voice interrupted. "Still fighting as usual, I see! What kind of knights are you, anyway, to rescue us poor damsels in distress, and then never even know that we're alive?" A



tall, willowy brunette had seen the two physicists as she entered the saloon, and came over to their table, a hand outstretched to each in cordial greeting.

"Ho, Verna!" both men exclaimed, and came to their feet as they welcomed the smiling, graceful newcomer.

"Sit down here, Verna—we have hardly started," Westfall invited, and Brandon looked at the girl in assumed surprise as she seated herself in the proffered chair.

"Well, Verna, it's like this, . . ." he began.

"That's enough!" she broke in. "That phrase always was your introduction to one of the world's greatest brainstormers. But I know that this is the first time you have had time even to eat like civilized beings, so I'll forgive you this once. Why all the registering of amazement, Norman?"

"I'm astonished that you aren't being monopolized by some husband or other. Surely the officers of the *Arcturus* weren't so dumb that they'd stand for your still being Verna Pickering, were they?"

"Not dumb, Norman, no. Far from it. But I'm still working for my M. R. S. degree, and I haven't succeeded in snaring it yet. You'd be surprised at how cagy those officers got after a few of them had been captured. But they are just like any other hunted game, I suppose—the antelopes that survive get pretty wild, you know," she concluded, plaintively.

"Well, that certainly is one tough break for a poor little girl," Brandon sympathized. "Quince, our little Nell, here, hasn't been done right by. I'm bashful and you're a woman-hater, but between us, some way, we've simply got to take steps."

"You might take longer steps than you think," Verna laughed, her regular, white teeth and vivid coloring emphasized by her olive skin and her startling hair, black as Brandon's own. "Perhaps I would like a scientist better than an I-P officer, anyway. The more I think of it, the surer I am that Nadia Newton had the right idea. I believe that I'll catch me a physicist, too—either of you would do quite nicely, I think," and she studied the two men carefully.

Westfall, the methodical and precise, had never been able to defend himself against Verna Pickering's badinage, but Brandon's ready tongue took up the challenge.

"Verna, if you really decided to get any living man he wouldn't stand a chance in the world," he declared. "If you've already made up your mind that I'm your meat, I'll come down like Davy Crockett's coon. But if either of us will do, that'll give us each a fifty-fifty chance to escape your toils. What say we play a game of freeze-out to decide it?"

"Fine, Norman! When shall we play?"

"Oh, between Wednesday and Thursday, any week you say," and the two fenced on, banteringly but skillfully, with Westfall an appreciative and unembarrassed listener.

Dinner over, Brandon and Westfall went back to the control room, where they found Stevens already seated at one of the master screens.

"All x, Perce?"

"All x. The observers report no registrations during the last two watches," and the three fell into discussion. Long they talked, studying every angle of the situation confronting them; until suddenly a speaker rattled furiously and an enormous, staring eye filled both master plates. Brandon's hand flashed to a switch, but

the image disappeared even before he could establish the full-coverage ray screen.

"I'm on the upper band—take the lower!" he snapped, but Stevens' projector was already in action. Trained minds all, they knew that some intelligence had traced them, and all realized that it was of the utmost importance to know what and where that intelligence was. Stevens found the probing frequency in his range and they flashed their own beam along it, encountering finally one of the monstrous Vorkulian fortresses, far from Jupiter and almost directly between them and the planet! Its wall screens were in operation, and no frequency at their command could penetrate that neutralizing blanket of vibrations.

"What kind of an eye was that—ever see anything like it, Perce?" Brandon demanded.

"I don't think so, though of course we got only an awfully short flash of it. It didn't look like the periscopic eyes that those flying snakes had—looked more like a hexan eye, don't you think? Couldn't very well be hexan, though, in that kind of a ship."

"Don't think so, either. Maybe it's a purely mechanical affair that they use for observing. Anyway, old sons, I don't like the looks of things at all. Quince, you're the brains of this outfit—shift the massive old intellect into high and tell us what to do."

Westfall, staring into the eyepiece of the filar micrometer, finished measuring the apparent size of the heptagon before he turned toward Stevens and Brandon.

"It is hard to decide upon a course of action, since anything that we do may prove to be wrong," he said, slowly. "However, I do not see that this latest development can operate to change the plan we have already adopted; that of running away, straight out from the sun. We may have to increase our acceleration to the highest value the women and babies can stand. A series of observations of our pursuer will, of course, be necessary to decide that point. It would be useless to go to Titan, for they would be powerless to help us. We could not hold their mirror upon either the *Sirius* or their torpedoes against such forces as that fortress has at her command. Then, too, we might well be bringing down upon them an enemy who would destroy much of their world before he could be stopped. Both Uranus and Neptune are approximately upon our present course. Do the Titanians know anything of either of them, Steve?"

"Not a thing," the computer replied. "They can't get nearly as far as Uranus on their power beam—it's all they can do to make Jupiter. They seem to think, though, that one or more of the satellites of Uranus or Neptune may be inhabited by beings similar to themselves, only perhaps even more so. But considering the difference between what we found on the Jovian satellites and on Titan, I'd say that anything might be out there—on Uranus, Neptune, their satellites, or anywhere else."

"Cancel Uranus, and double that for Neptune," Brandon commanded. "Realize how far away they are?"

"That's right, too," agreed Stevens. "Before we got there, with any acceleration we can use now, this whole mess will be cleaned up, one way or the other."

**W**ESTFALL completed the series of observations and calculated his results. Then, with a grave face, he went to consult the medical officers. The

women, children, and the two Martian scientists were sent to the sick-bay and the acceleration was raised slowly to twenty meters per second per second, above which point the physicians declared they should not go unless it became absolutely necessary. Then the scientists met again—met without Alcantro and Fedanzo, who lay helpless upon narrow hospital bunks, unable even to lift their massive arms.

While Westfall made another series of precise measurements of the super-dreadnaught of space so earnestly pursuing them, Brandon stumbled heavily about the room, hands jammed deep into pockets, eyes unseeing, emitting clouds of smoke from his villainously reeking pipe. The Venerians, lacking Brandon's physical strength and by nature quieter of disposition, sat motionless; keen minds hard at work. Stevens sat at the calculating machine, absently setting up and knocking down weird and meaningless integrals, while he also concentrated upon the problem before them.

"They are still gaining, but comparatively slowly," Westfall finally reported. "They seem to be. . ."

"In that case we may be all x," Brandon interrupted, brandishing his pipe vigorously. "We know that they're on a beam—apparently we're the only ones hereabouts having cosmic power. If we can keep away from them until their beam attenuates, we can whittle 'em down to our size and then take them, no matter how much accumulator capacity they've got."

"But can we keep away from them that long?" asked Dol Kenor, pointedly; and his fellow Venerian also had a question to propound:

"Would it not be preferable to lead them in a wide circle, back to a rendezvous with the Space Fleet, which will probably be ready by the time of meeting?"

"I am afraid that that would be useless," Westfall frowned in thought. "Given power, that fortress could destroy the entire Fleet almost as easily as she could wipe out the *Sirius* alone."

"Kenor's right," Stevens spoke up from the calculator. "You're getting too far ahead of the situation. We aren't apt to keep ahead of them long enough to do much leading anywhere. The Titanians can hold a beam together from Saturn to Jupiter—why can't these snake-folks?"

"Several reasons," Brandon argued stubbornly. "First place, look at the mass of that thing, and remember that the heavier the beam the harder it is to hold it together. Second, there's no evidence that they wander around much in space. If their beams are designed principally for travel upon Jupiter, why should they have any extraordinary range? I say they can't hold that beam forever. We've got a good long lead, and in spite of their higher acceleration, I think we'll be able to keep out of range of their heavy stuff. If so, we'll trace a circle—only one a good deal bigger than the one Amonar suggested—and meet the fleet at a point where that enemy ship will be about out of power."

Thus for hours the scientists argued, agreeing upon nothing, while the Vorkulian fortress crept ever closer. At the end of three days of the mad fight, the pursuing space ship was in plain sight, covering hundreds of divisions of the micrometer screens. But now the size of the images was increasing with extreme slowness, and the scientists of the *Sirius* watched with strained attention the edges of those glowing green pictures. Finally, when the pictured edges were about to cease moving

across the finely-ruled lines, Brandon cut down his own acceleration a trifle, and kept on decreasing it at such a rate that the heptagon still crept up, foot by foot.

"Hey what's the big idea?" Stevens demanded.

"Coax 'em along. If we run away from them they'll probably reverse power and go back home, won't they? Their beam is falling apart fast, but they're still getting so much stuff along it that we couldn't do a thing to stop them. If they think that we're losing power even faster than they are, though, they'll keep after us until their beam's so thin that they'll just be able to stop on it. Then they'll reverse or else go onto their accumulators—reverse, probably, since they'll be a long ways from home by that time. We'll reverse, too, and keep just out of range. Then, when we both have stopped and are about to start back, their beam will be at its minimum and we'll go to work on 'em—foot, horse, and marines. Nobody can run us as ragged as they've been doing and get away with it as long as I'm conscious and stand a chance in the world of hanging one onto their chins in retaliation. I've got a hunch. If it works, we can take those birds alone, and take 'em so they'll stay took. We might as well break up—this is going to be an ordinary job of piloting for a few days, I think. I'm going up and work with the Martians on that hunch. You fellows work out any ideas you want to. Watch 'em close, Mac. Keep kidding 'em along, but don't let them get close enough to puncture us."

EVERYTHING worked out practically as Brandon had foretold, and a few days later, their acceleration somewhat less than terrestrial gravity, he called another meeting in the control room. He came in grinning from ear to ear, accompanied by the two Martians, and seated himself at his complex power panel.

"Now watch the professor closely, gentlemen," he invited. "He is going to cut that beam."

"But you can't," protested Pyraz Amonar.

"I know you can't, ordinarily, when a beam is tight and solid. But that beam's as loose as ashes right now. I told you I had a hunch, and Alcantro and Fedanzo worked out the right answer for me. If I can cut it, Quince, and if their screens go down for a minute, shoot your visiray into them and see what you can see."

"All x. How much power are you going to draw?"

"Plenty—it figures a little better than four hundred thousand kilofranks. I'll draw it all from the accumulators, so as not to disturb you fellows on the cosmic intake. We don't care if we do run the batteries down some, but I don't want to hold that load on the bus-bars very long. However, if my hunch is right, I won't be on that beam five minutes before it's cut from Jupiter—and I'll bet you four dollars that you won't see the original crew in that fort when you get into it."

He set upper and lower bands of dirigible projectors to apply a powerful sidewise thrust, and the *Sirius* darted off her course. Flashing a minute pencil behind the huge heptagon, Brandon manipulated his tuning circuits until a brilliant spot in space showed him that he was approaching resonance with the heptagon's power beam. Micrometer dials were then engaged and the delicate tuning continued until the meters gave evidence that the two beams were precisely synchronized and exactly opposite in phase. Four plunger switches closed, that tiny pilot ray became an enormous rod of force, and as those two gigantic beams met in exact opposition and

neutralized each other, a solid wall of blinding brilliance appeared in the empty ether behind the Vorkulian fortress. As that dazzling wall sprang into being, the sparkling green protection died from the walls of the heptagon.

"Go to it, Quince!" Brandon yelled, but the suggestion was entirely superfluous. Even before the wall-screen had died, Westfall's beam was trying to get through it, and when the visiray revealed the interior of the heptagon, the quiet and methodical physicist was shaken from his habitual calm.

"Why, they aren't the winged monsters at all—they're *hexans*!" he exclaimed.

"Sure they are." Brandon did not even turn his heavily-goggled eyes from the blazing blankness of his own screen. "That was my hunch. Those snakes went about things in a business-like fashion. They didn't strike me as being folks who would pull off such a wild stunt as trying to chase us clear out of the solar system, but a gang of hexans would do just that. Some of them must have captured that ship and, already having it in their cock-eyed brains that we were back of what happened on Callisto, they decided to bump us off if it was the last thing they ever did. That's what I'd do myself, if I were a hexan. Now I'll tell you what's happening back at the home power plant of that ship and what's going to happen next. I'm kicking up a horrible row out there with my interference, and a lot of instruments at the other end of that beam must be cutting up all kinds of didoes, right now. They'll check up on that ship with the expedition, by radio and whatnot, and when they find out that it's clear out here—chop! Didn't get to see much, did you?"

"No, they must have switched over to their accumulators almost instantly."

"Yeah, but if they've got accumulator capacity enough to hold off our entire cosmic intake and get back to Jupiter besides, I'm a polyp! We're going to take that ship, fellows, and learn a lot of stuff we never dreamed of before. Ha! There goes his beam—pay me the four, Quince."

The dazzling wall of incandescence had blinked out without warning, and Brandon's beam bored on through space, unimpeded. He shut it off and turned to his fellows with a grin—a grin which disappeared instantly as a thought struck him and he leaped back to his board.

"Sound the high-acceleration warning quick, Perce!" he snapped, and drove in switch after switch.

"Cosmic intake's gone down to zero!" exclaimed MacDonal, as the *Sirius* leaped away.

"Had to cut it—they might shoot a jolt through that band. Just thought of something. Maybe unnecessary, but no harm done if . . . it's necessary, all x—we're taking a sweet kissing right now. You see, even though we're at pretty long range, they've got some horrible projectors, and they were evidently mad enough to waste some power taking a good, solid flash at us—and if we hadn't been expecting it, that flash would have been a bountiful sufficiency, believe me—Great Cat! Look at that meter—and I've had to throw in number ten shunt! The outer screen is drawing five hundred and forty thousand!"

THEY stared at the meter in amazement. It was incredible, even after they had seen those heptagons in action, that at such extreme range any offensive

beam could be driven with such unthinkable power—power requiring for its neutralization almost the full output of the prodigious batteries of accumulators carried by the *Sirius*! Yet for five, ten, fifteen, twenty minutes that beam drove furiously against their straining screens, and even Brandon's face grew tense and hard as that frightful attack continued. At the end of twenty-two minutes, however, the pointer of the meter snapped back to the pin and every man there breathed an explosive sigh of relief—the almost unbearable bombardment was over; the screen was drawing only its maintenance load.

"Wow!" Brandon shouted. "I thought for a minute they were going to hang to us until we cracked, even if it meant that they'd have to freeze to death out here themselves!"

"It would have meant that, too, don't you think?" asked Stevens.

"I imagine so—don't see how they could possibly have enough power left to get back to Jupiter if they shine that thing on us much longer. Of course, the more power they waste on us, the quicker we can take them; but I don't want much more of that beam, I'll tell the world—I just about had heart failure before they cut it off!"

The massive heptagon was now drifting back toward Jupiter at constant velocity. The hexans were apparently hoarding jealously their remaining power, for their wall screens did not flash on at the touch of the visiray. Through unresisting metal the probing Terrestrial beams sped, and the scientists studied minutely every detail of the Vorkulian armament; while the regular observers began to make a detailed photographic survey of every room and compartment of the great fortress. Much of the instrumentation and machinery was familiar, but some of it was so strange that study was useless—days of personal inspection and experiment, perhaps complete dismantling, would be necessary to reveal the secrets hidden within those peculiar mechanisms.

"They're trying to save all the power they can—think I'll make them spend some more," Brandon remarked, and directed against the heptagon a heavy destructive beam. "We don't want them to get back to Jupiter until after we've boarded them and found out everything we want to know. Come here, Quince—what do you make of this?"

Both men stared at the heptagon, frankly puzzled; for the screens of the strange vessel did not radiate, nor did the material of the walls yield under the terrible force of the beam. The destructive ray simply struck that dull green surface and vanished—disappeared without a trace, as a tiny stream of water disappears into a partially-soaked sponge.

"Do you know what you are doing?" asked Westfall, after a few minutes' thought. "I believe that you are charging their accumulators at the rate of," he glanced at a meter, "exactly thirty-one thousand five hundred kilofranks."

"Great Cat!" Brandon's hand flashed to a switch and the beam expired. "But they can't just simply grab it and store it, Quince—it's impossible!"

"The word 'impossible' in that connection, coming from you, has a queer sound," Westfall said pointedly, and Brandon actually blushed.

"That's right, too—we have got pretty much the same idea in our cosmic intake fields, but we didn't carry

things half as far as they have done. Huh! They're flashing us again . . . but those thin little beams don't mean anything. They're just trying to make us feed them some more, I guess. But we've got to hold them back some way—wonder if they can absorb a tractor field?"

The hexans had lashed out a few times with their lighter weapons, but, finding the *Sirius* unresponsive, had soon shut them off and were stolidly plunging along toward Jupiter. Brandon flung out a tractor rod and threw the mass of his cruiser upon it as it locked into those sullen green walls. But as soon as the enemy felt its drag, their screens flared white, and the massive Terrestrial space-ship quivered in every member as that terrific cable of force was snapped.

"They apparently cannot store up the energy of a tractor," commented Westfall, "but you will observe that they have no difficulty in radiating when they care to."

"Those two ideas didn't pan out so heavy. There's lots of things not tried yet, though. Our next best bet is to get around in front of him and push back. If they wiggle away from more than fifty percent of a pressor, they're really good."

The pilot maneuvered the *Sirius* into line, directly between Jupiter and the pentagon; and as the driving projectors went into action, Brandon drove a mighty pressor field along their axis, squarely into the center of mass of the Vorkulian fortress. For a moment it held solidly, then, as the screens of the enemy went into action, it rebounded and glanced off in sparkling, cascading torrents. But the hexans, with all their twisting and turning, could not present to that prodigious beam of force any angle sufficiently obtuse to rob it of half its power, and the driving projectors of the pentagon again burst into activity as the backward-pushing mass of the *Sirius* made itself felt. In a short time, however, the wall-screens were again cut off—apparently more power was required to drive them than they were able to deflect.

Although even the enormous tonnage of the Terrestrial cruiser was insignificant in comparison with the veritable mountain of metal to which she was opposed, so that the fiercest thrust of her driving projectors did not greatly affect the monster's progress; yet Brandon and his cohorts were well content.

"It's a long trip back to where they came from, and since they wanted to drift all the way, I think they'll be out of power before they get there," Brandon summed up the situation. "We aren't losing any power, either, since we are using only a part of our cosmic intake."

In a few hours the struggle had settled down to a routine matter—the *Sirius* being pushed backward steadily against the full drive of her every projector, contesting stubbornly every mile of space traversed. Assured that the regular pilots and lookouts were fully capable of handling the vessel, the scientists were about to resume their interrupted tasks when one of the photographers called them over to look at something he had discovered in one of the lowermost and smallest compartments of the heptagon. All crowded around the screens, and saw pictured there the winged, snake-like form of one of the original crew of the Vorkulian vessel!

"Dead?" Brandon asked.

"Not yet," replied the photographer. "He is twitching a little once in a while, but you see, he's pretty badly cut up."

"I see he . . . he must have a lot of vitality to have lasted this long—may be he'll live through it yet. Hold him on the plate, and get his exact measurements." He turned to the communicator. "Doctor von Steiffel? Can you come down to the control room a minute? We may want you to operate upon one of these South Jovians after a while."

"Himmel! Es ist der. . ." The great surgeon, bearded and massive, stared into the plate, and in his surprise started to speak in his native German. He paused, his long, powerful fingers tracing the likeness of the Vorkul upon the plate, then went on: "I would like very much to operate, but, not understanding our intentions, he would, of course, struggle. And when that body struggles—*schrecklichkeit!*" and he waved his arms in a pantomime of wholesale destruction.

"I thought of that—that's why I am talking to you now instead of when we get to him, two or three days from now. We'll give you his exact measurements, and a crew of mechanics will, under your direction, sink holes in the steel floor and install steel bands heavy enough to hold him rigid, from tailfins to wing-tips. We'll hold him there until we can make him understand that we're friends. It is of the utmost importance to save that creature's life if possible; because we do not want one of their fortresses launched against us—and in any event, it will not do us any harm to have a friend in the City of the South."

"Right. I will also have prepared some kind of a space-suit in which he can be brought from his vessel to ours," and the surgeon took the measurements and went to see that the "operating table" and suit were made ready for Kromodeor, the sorely wounded Vorkul.

IT was not long until the projectors of the heptagon went out and she lay inert in space, power completely exhausted. Knowing that the screens of the enemy would absorb any ordinary ray, the scientists had calculated the most condensed beam they could possibly project, a beam which, their figures showed, should be able to puncture those screens by sheer mass action—puncture them practically instantaneously, before the absorbers could react. To that end they had arranged their circuits to hurl seven hundred sixty-five thousand kilofranks—the entire power of their massed accumulators and their highest possible cosmic intake—in one tiny bar of superlative density, less than one meter in diameter! Everything ready, Brandon shot in prodigious switches that launched that bolt—a bolt so vehement, so inconceivably intense, that it seemed fairly to blast the very ether out of existence as it tore its way along its carefully predetermined line. The intention was to destroy all the control panels of the absorber screens; parts so vital that without them the great vessel would be helpless, and yet items which the Terrestrials could reconstruct quite readily from their photographs and drawings.

As that irresistible bolt touched the Vorkulian wall-screen, the spot of contact flared instantaneously through the spectrum and into the black beyond the violet as that screen overloaded locally. Fast as it responded and highly conductive though it was, it could not handle that frightfully concentrated load. In the same fleeting in-



stant of time every molecule of substance in that beam's path flashed into tenuous vapor—no conceivable material could resist or impede that stabbing stiletto of energy—and the main control panel of the Vorkulian wall-screen system vanished. Time after time, as rapidly as he could sight his beam and operate his switches, Brandon drove his needle of annihilation through the fortress, destroying the secondary controls. Then, the walls unresisting, he cut in the vastly larger, but infinitely less powerful, I-P ray, and with it systematically riddled the immense heptagon. Out through the gaping holes in the outer walls rushed the dense atmosphere of Jupiter, and the hexans in their massed hundreds died.

The *Sirius* was brought up beside the heptagon, so that her main air-lock was against one of the yawning holes in the green metal wall of the enemy. There she was anchored by tractor beams, and the two hundred picked men of the I-P police, in full space equipment, prepared to board the gigantic fortress of the void. Brandon sat tense at his controls, ready to send his beam ahead of the troopers against any hexans that might survive in some as yet unpunctured compartment. General Crowninshield sat beside the physicist at an auxiliary board, phones at ears and four infra-red visiray plates ranged in front of him; ready through light or darkness to direct and oversee the attack, no matter where it might lead or how widely separated the platoons might become before the citadel was taken.

The space-line men—the engineers of weightless combat—led the van, protected by the projectors of their fellows. Theirs the task to set up ways of rope, along which the others could advance. Power drills bit savagely into metal, making holes to receive the expanding eyebolts; grappling hooks seized fast every protuberance and corner; points of little stress were supported by powerful suction cups; and at intervals were strung beam-fed lanterns, illuminating brilliantly the line of march. Through compartments and down corridors they went, bridging the many gaps in the metal through which Brandon's beams had blasted their way; guided by Crowninshield along the shortest feasible path toward the little projector room in which Kromodeor, the wounded Vorkul, lay. There were so many chambers and compartments in the heptagon that it had, of course, been impossible to puncture them all, and in some of the tight rooms were groups of hexans, anxious to do battle. But the general's eye led his men, and if such a room lay before them, Brandon's frightful beam entered it first—and where that beam entered, life departed.

But the hexans were really intelligent, as has been said. They had had time to prepare for what they knew awaited them, and they were rendered utterly desperate by the knowledge that, no matter what might happen, their course was run. Their power was gone, and even if the present enemy should be driven off, they would float idly in space until they died of cold; or, more probably, hurtling toward Jupiter as they were, they would plunge to certain death upon its surface as soon as they came within its powerful gravitational field. Therefore some fifty of the creatures, who had had space experience in their spherical vessels, had spent the preceding days in manufacturing space equipment. Let the weight-fiends plan upon detonating magazines of explosives, upon laying mines calculated to destroy the invaders, even the vessel itself and all within it. Let them

plan upon any other such idle schemes, which were certain to be foreseen and guarded against by the space-hardened veterans who undoubtedly moaned that all-powerful and vengeful football of scarred gray metal. Space-fighters were they, and as space-fighters would they die; taking with them to their own inevitable death a full quota of the enemy.

THUS it came about that the head of the column of police had scarcely passed a certain door, when in the room behind it there began to assemble the half-hundred spacehounds of the hexans. When the vanguard had approached that room, Crowninshield had inspected it thoroughly with his infra-red beams. He had found it punctured and airless, devoid of life or of lethal devices, and had passed on. But now the space-suited warriors of the horde, guided in their hiding by their own visirays, were massing there. When the center of the I-P column reached that door, it burst open. There boiled out into the corridor, into the very midst of the police, fifty demoniacal hexans, fighting with Berserk fury, ruled by but one impulse—to kill.

Hand-weapons flashed viciously, tearing at steel armor and at bulging space-suits. Space-hooks bit and tore. Pikes and lances were driven with the full power of brawny arms. Here and there could be seen trooper and hexan, locked together in fierce embrace far from any hand-line—six limbs against four, all ten plied with abandon in mortal, hand-to-hand, foot-to-foot combat.

"Give way!" yelled Crowninshield into the ears of his men. "Epstein, back! LeFevre, advance! Get out of block ten—give us a chance to use a beam!"

As the police fell back out of the designated section of the corridor, Brandon's beam tore through it, filling it from floor to ceiling with a volume of intolerable energy. In that energy walls, doorway, and space-lines, as well as most of the hexans, vanished utterly. But the beam could not be used again. Every surviving enemy had hurled himself frantically into the thickest ranks of the police and the battle raged fiercer than ever. It did not last long. The ends of the column had already closed in. The police filled the corridor and overflowed into the yawning chasm cut by the annihilating ray. Out-numbered, surrounded upon all sides, above, and below by the Terrestrials, the hexans fought with mad desperation to the last man—and to the last man died. And even though in lieu of their own highly efficient space-armor they had fought in weak, crude, and hastily improvised space-suits, which were pitifully inferior to the ray resistant, heavy steel armor of the I-P forces, nevertheless the enormous strength and utter savagery of the hexans had taken toll; and when the advance was resumed, it was with extra lookouts scanning the entire neighborhood of the line of march.

Since the troops had entered the fortress as close to their goal as possible, it was not long until the leading platoon reached the door behind which Kromodeor lay. Tools and cylinders of air were brought up, and the engineers quickly fitted pressure bulkheads across the corridor. There was a screaming hiss from the valves, the atmosphere in that walled-off space became dense, and mechanics attacked with their power drills the door of the projector room. It opened, and four husky orderlies rapidly but gently encased the long body of the Vorkul in the space-suit built especially to receive it. As that monstrous form in its weirdly bulging envelope

was guided through the air-locks into the *Sirius*. Crown-inshield barked orders into his transmitter and the police reformed. They would now systematically scour the fortress, to wipe out any hexans that might still be in hiding; to discover and destroy any possible traps or infernal machines which the enemy might have planted for their undoing.

Assured that the real danger to the *Sirius* was over and that his presence was no longer necessary, Brandon turned his controls over to an assistant and went up to the Venerian rooms, where von Steiffel and his staff were to operate upon the Vorkul. There, in the dense, hot air, but little different now from the atmosphere of Jupiter, Kromodeor lay; bolted down to the solid steel of the floor by means of padded steel straps. So heavy were the bands that he could not possibly break even one of them; so closely were they spaced that he could scarcely have moved a muscle had he tried. But he did not try—so near death was he that his mighty muscles did not even quiver at the treacherous bite of the surgeon's tools. Von Steiffel and his aides, meticulously covered with sterile gowns, hoods, and gloves, worked in most rigidly aseptic style; deftly and rapidly closing the ghastly wounds inflicted by the weapons of the hexans.

"Hi, Brandon," the surgeon grunted as he straightened up, the work completed. "I did not use much antiseptic on him. Because of possible differences in blood chemistry and in ignorance of his native bacteria, I depended almost wholly upon asepsis and his natural resistance. It is a good thing that we did not have to use an anaesthetic. He is in bad shape, but if we can feed him successfully, he may pull through."

"Feed him? I never thought of that. What d'you suppose he eats?"

"I have an idea that it is something highly concentrated, from his anatomy. I shall try giving him sugar, milk chocolate, something of the kind. First I shall try maple syrup. Being a liquid, it is easily administered, and its penetrating odor also may be a help."

A CAN of the liquid was brought in and to the amazement of the Terrestrials, the long, delicate antennae of the Vorkul began to twitch as soon as the can was opened. Motioning hastily for silence, von Steiffel filled a bowl and placed it upon the floor beneath Kromodeor's grotesque nose. The twitching increased, until finally one dull, glazed eye brightened somewhat and curled slowly out upon its slender pedicle, toward the dish. His mouth opened sluggishly and a long, red tongue reached out, but as his perceptions quickened, he became conscious of the strangers near him. The mouth snapped shut, the eye retracted, and heaving, rippling surges traversed that powerful body as he struggled madly against the unbreakable shackles of steel binding him to the floor.

"Ach, kindleint!" The surgeon bent anxiously over that grotesque but frightened head; soothing, polysyllabic German crooning from his bearded lips.

"Here, let's try this—I'm good on it," Stevens suggested, bringing up the Callistian thought exchanger. All three men donned headsets, and sent wave after wave of friendly and soothing thoughts toward that frantic and terrified brain.

"He's got his brain shut up like a clam!" Brandon snorted. "Open up, guy—we aren't going to hurt you! We're the best friends you've got, if you only knew it!"

"Himmel, und he iss himself killing!" moaned von Steiffel.

"One more chance that might work," and Brandon stepped over to the communicator, demanding that Verna Pickering be brought at once. She came in as soon as the air-locks would permit, and the physicist welcomed her eagerly.

"This fellow's fighting so he's tearing himself to pieces. We can't make him receive a thought, and von Steiffel's afraid to use an anaesthetic. Now it's barely possible that he may understand hexan. I thought you wasted time learning any of it, but maybe you didn't—see if you can make him understand that we're friends."

The girl flinched and shrank back involuntarily, but forced herself to approach that awful head. Bending over, she repeated over and over one harsh, barking syllable. The effect of that word was magical. Instantly Kromodeor ceased struggling, an eye curled out, and that long, supple tongue flashed down and into the syrup. Not until the last sticky trace had been licked from the bowl did his attention wander from the food. Then the eye, sparkling brightly now, was raised toward the girl. Simultaneously four other eyes arose, one directed at each of the men and the other surveying his bonds and the room in which he was. Then the Vorkul spoke, but his whistling, hissing manner of speech so garbled the barking sounds of the hexan words he was attempting to utter, that Verna's slight knowledge of the language was of no use. She therefore put on one of the headsets, motioning the men to do the same, and approached Kromodeor with the other, repeating the hexan word of friendly import. This time the Vorkul's brain was not sealed against the visitors and thoughts began to flow.

"You've used those things a lot," Brandon turned to Stevens in a quick aside. "Can you hide your thoughts?"

"Sure—why?"

"All I can think of is that power system of theirs, and he'd know what we were going to do, sure. And I'd better be getting at it anyway. So you can wipe that off your mind with a clear conscience—the rest of us will get everything they've got there. Your job's to get everything you can out of this bird's brain. All x?"

"All x."

"Why, you didn't put yours on!" Verna exclaimed.

"No, I don't think I'll have time. If I get started talking to him now, I'd be here from now on, and I've got a lot of work to do. Steve can talk to him for me—see you later," and Brandon was gone.

He went directly to the Vorkulian fortress, bare now of hexan life and devoid of hexan snares and traps. There he and his fellows labored day after day learning every secret of every item of armament and equipment aboard the heptagon.

"Did you finish up today, Norm?" asked Stevens one evening. "Kromodeor's coming to life fast. He's able to wiggle around a little now, and is insisting that we take off the one chain we keep on him and let him use a plate, to call his people."

"All washed up. Guess I'll go in and talk to him—you all say he's such an egg. With this stuff off my mind I can hide it well enough. By the way, what does he eat?" And the two friends set out for the Venerian rooms.

"Anything that's sweet, apparently, with just enough milk to furnish a little protein. Won't eat meat or

vegetables at all—von Steiffel says they haven't got much of a digestive tract, and I know that they haven't got any teeth. He's already eaten most all the syrup we had on board, all of the milk chocolate, and a lot of the sugar. But none of us can get any kind of a raise out of him at all—not even Nadia, when she fed him a whole box of chocolates."

"No, I mean what does he eat when he's home?"

"It seems to be a sort of syrup, made from the juices of jungle plants, which they drag in on automatic conveyors and process on automatic machinery. But he's a funny mutt—hard to get. Some of his thoughts are lucid enough, but others we can't make out at all—they are so foreign to all human nature that they simply do not register as thoughts at all. One funny thing, he isn't the least bit curious about anything. He doesn't want to examine anything, doesn't ask us any questions, and won't tell us anything about anything, so that all we know about him we found out purely by accident. For instance, they like games and sports, and seem to have families. They also have love, liking, and respect for others of their own race—but they seem to have no emotions whatever for outsiders. They're utterly inhuman—I can't describe it—you'll have to get it for yourself."

"Did you find out about the Callistonians who went to see them?"

"Negatively, yes. They never arrived. They probably couldn't see in the fog and must have missed the city. If they tried to land in that jungle, it was just too bad!"

"That would account for everything. So they're strictly neutral, eh? Well, I'll tell him 'hi,' anyway." Now in the sickroom, Brandon picked up the headset and sent out a wave of cheery greeting.

To his amazement, the mind of the Vorkul was utterly unresponsive to his thoughts. Not disdainful, not inimical; not appreciative, nor friendly—simply indifferent to a degree unknown and incomprehensible to any human mind. He sent Brandon only one message, which came clear and coldly emotionless.

"I do not want to talk to you. Tell the hairy doctor that I am now strong enough to be allowed to go to the communicator screen. That is all." The Vorkul's mind again became an oblivious maze of unintelligible thoughts. Not deliberately were Kromodeor's thoughts hidden; he was constitutionally unable to interest himself in the thoughts or things of any alien intelligence.

"Well, that for that." A puzzled, thoughtful look came over Brandon's face as he called von Steiffel. "A queer duck, if there ever was one. However, their ship will never bother us, that's one good thing; and I think we've got about everything of theirs that we want, anyway."

The surgeon, after a careful examination of his patient, unlocked the heavy collar with which he had been restraining the over-anxious Vorkul, and supported him lightly at the communicator panel. As surely as though he had used those controls for years Kromodeor shot the visiray beam out into space. One hand upon each of the several dials and one eye upon each meter, it was a matter only of seconds for him to get in touch with Vorkulia. To the Terrestrials the screen was a gray and foggy blank; but the manifest excitement shrieking and whistling from the speaker in response to Kromodeor's signals made it plain that his message was being received with enthusiasm.

"They are coming," the Vorkul thought, and lay back, exhausted.

"Just as well that they're comin' out here, at that," Brandon commented. "We couldn't begin to handle that structure anywhere near Jupiter—in fact, we wouldn't want to get very close ourselves, with passengers aboard."

Such was the power of the Vorkulian vessels that in less than twenty hours another heptagon slowed to a halt beside the *Sirius* and two of its crew were waited aboard.

They were ushered into the Venerian room, where they talked briefly with their wounded fellow before they dressed him in a space-suit, which they filled with air to their own pressure. Then all three were lifted lightly into the air, and without a word or a sign were borne through the air-locks of the vessel, and into an opening in the wall of the rescuing heptagon. A green tractor beam reached out, seizing the derelict, and both structures darted away at such a pace that in a few minutes they had disappeared in the black depths of space.

"Well—that, as I may have remarked before, is indisputably and conclusively that." Brandon broke the surprised, almost stunned, silence that followed the unceremonious departure of the visitors. "I don't know whether to feel relieved at the knowledge that they won't bother us, or whether to get mad because they won't have anything to do with us."

He sent the "All x" signal to the pilot and the *Sirius*, once more at the acceleration of Terrestrial gravity, again bored on through space.

## CHAPTER XIII

### Spacehounds Triumphant

NOW that the hexan threat that had so long oppressed the humanity of the *Sirius* was lifted, that dull gray football of armor steel was filled with relief and rejoicing as the pilot laid his course for Europa. Lounges and saloons resounded with noise as police, passengers, and such of the crew as were at liberty made merry. The control room, in which were grouped the leaders of the expedition and the scientists, was orderly enough, but a noticeable undertone of gladness had replaced the tense air it had known so long.

"Hi, men!" Nadia Stevens and Verna Pickering, arms around each other's waists, entered the room and saluted the group gaily before they became a part of it.

"Smatter, girls—tired of dancing already?" asked Brandon.

"Oh, no—we could dance from now on," Verna assured him. "But you see, Nadia hadn't seen that husband of hers for fifteen minutes, and was getting lonesome. Being afraid of all you men, she wanted me to come along for moral support. The real reason I came, though," and she narrowed her expressive eyes and lowered her voice mysteriously, "is that you two physicists are here. I want to study my chosen victims a little longer before I decide over which of you to cast the spell of my fatal charm."

"But you can't do that," he objected, vigorously. "Quince and I are going to settle that ourselves some day—by shooting dice, or maybe each other, or . . ." he broke off, listening to an animated conversation going on behind them.

"... just simply outrageous!" Nadia was exclaiming. "Here we saved his life, and I fed him a lot of my candy, and we went to all the trouble of bringing their ship back here almost to Jupiter for them, and then they simply dashed off without a word of thanks or anything! And he always acted as though he never wanted to see or hear of any of us again, ever! Why, they don't *think* straight—as Norman would say it, they're full of little red ants! Why, they aren't even human!"

"Sure not." Brandon turned to the flushed speaker. "They couldn't be, hardly, with their make-up. But is it absolutely necessary that all intelligent beings should possess such an emotion as gratitude? Such a being without it does seem funny to us, but I can't see that its lack necessarily implies anything particularly important. Keep still a minute," he went on, as Nadia tried to interrupt him, "and listen to some real wisdom. Quince you tell 'em."

"They are, of course, very highly developed and extremely intelligent; but it should not be surprising that intelligence should manifest itself in ways quite baffling to us human beings, whose minds work so differently. They are, however . . . well, peculiar."

"I *won't* keep still!" Nadia burst out, at the first opportunity. "I don't want to talk about those hideous things any more, anyway. Come on, Steve, let's go up and dance!"

Crowninshield turned to Verna, with the obvious intention of leading her away, but Brandon interposed. "Sorry, Crown, but this lady is conducting a highly important psychological research, so your purely social claims will have to wait until after the scientific work is done."

"Why narrow the field of investigation?" laughed the girl. "I'd rather widen it, myself—I might prefer a general, even to a physicist!"

They went up to the main saloon and joined the *mêlée* there, and after one dance with Verna—all he could claim in that crowd of men—Crowninshield turned to Brandon.

"You two seem to know Miss Pickering extraordinarily well. Would I be stepping on your toes if I give her a play?"

"Clear ether as far as we're concerned." Brandon shrugged his shoulders. "She's been kicking around under foot ever since she was knee high to a duck—we gave her her first lessons on a slide-rule."

"Don't be dumb, Norman. That woman's a knock-out—a riot—a regular tri-planet call-out!"

"Oh, she's all x, as far as that goes. She's a good little scout, too—not half as dumb as she acts—and she's one of the squarest little cats that ever waved a plume; but as for *playing* her—too much like our kid sister."

"Good—me for her!" and they made their way back down to the control room.

Stevens, after his one dance with Nadia, had already returned. Brandon and Crowninshield found him seated at the calculating machine, continuing a problem which already filled several pages of his notebook.

"Smatter, Steve? So glad to see a calculator and some paper that you can't let them alone?"

"Not exactly—just had a thought a day or so ago. Been computing the orbit of the wreckage of the *Arcturus* around Jupiter. Think we should salvage it—

the upper half, at least. It was left intact, you know."

"H . . . m . . . m. That would be nice, all right. Dope enough?"

"Got the direction solid, from my own observations; the velocity's a pretty rough approximation though. But after allowing for my probable error, it figures an ellipse of low eccentricity, between the orbits of Io and Europa. Its period is short—about two days."

"Isn't it wonderful to have a brain?" Brandon addressed the room at large. "The kid's clever. Nobody else would have thought of it, except maybe Westfall. Let's see your figures. Um . . . m . . . m. According to that, we're within an hour of it, right now." He turned to the pilot and sketched rapidly.

"Get on this line here, please, and decelerate, so that the stuff'll catch up with us, and pass the word to the lookouts. Stevens and I will take the bow plates."

"That's a good idea," he went on to Stevens, as they took their places at main and auxiliary ultra-banks. "Lot of plunder in that ship. Instruments, boats, and equipment worth millions, besides most of the junk of the passengers—clothes, trunks, trinkets, and what-not. You're there, bucko!"

"Thanks, Chief," . . . and they fell silent, watching the instruments carefully, and from time to time making computations from the readings of the acceleration and flight meters.

"There she is!" An alarm bell had finally sounded, the ultra-lights had flared out into space, and upon both screens there shone out images of the closely clustered wreckage of the *Arcturus*. But both men were more interested just then in the mathematics of the recovery than in the vessel itself.

"Missed it eight minutes of time and eleven divisions on the scale," reported Stevens. "Not so good."

"Not so bad either—I've seen worse computation." Thus lightly was dismissed a mathematical feat which, a few years earlier, before the days of I-P computers, would have been deemed worthy of publication in "The Philosophical Magazine."

DIRECTOR NEWTON was called in, and it was decided that the many small fragments of the vessel were not worth saving; that its upper half was all that they should attempt to tow the enormous distance back to Tellus. The pace of the *Strius* was adjusted to that of the floating masses, and tractor beams were clamped upon the undamaged portion of the derelict, and upon the two slices from the nose of the craft. A couple of the larger fragments of wreckage were also taken, to furnish metal for the repairs which would be necessary. Acceleration was brought slowly up to normal, and the battle-scarred cruiser of the void, with her heavy burden of inert metal, resumed her interrupted voyage toward Europa; the satellite upon which the passengers and crew of the ill-fated *Arcturus* had been so long immured. On she bored through the ether, detector screens full out and greenly scintillant Vorkulian wall-screens outlining her football shape in weird and ghastly light; unafraid now of any possible surviving space-craft of the hexans.

But if the hexans detected her, they made no sign. Perhaps their fleet had been destroyed utterly; perhaps it had been impressed upon even their fierce minds that those sparkling green screens were not to be molested with impunity! The satellite was reached without event



and down into the crater landing shaft the two enormous masses of metal dropped.

Callisto's foremost citizens were on hand to welcome the Terrestrial rescuers, and reverly reigned supreme in that deeply buried Europan community. All humanity celebrated. The Callistonians rejoiced because they were now freed from the age-old oppression of the hexan hordes; because they could once more extend their civilization over the Jovian satellites and live again their normal lives upon the surface of those small worlds.

The Terrestrials were almost equally enthusiastic in the reunion that marked the end of the long imprisonment of the refugees.

As soon as the hull of the *Arcturus* had been warmed sufficiently to permit inspection, its original passengers were allowed to visit it briefly, to examine and to reclaim their belongings. Of course, some damage had been done by the cold of interplanetary space, but in general everything was as they had left it. Stevens and Nadia were among the first permitted aboard. They went first to the control room, where Stevens found his bag still lying behind Breckenridge's desk, where he had thrown it when he first boarded the vessel. Then they made their way up to Nadia's stateroom, which they found in meticulous order and spotless in its cleanliness—there is neither dust nor dirt in space. Nadia glanced about the formal little room and laughed up at her husband.

"Funny, isn't it, sweetheart, how little we know what to expect? Just think how surprised I would have been, when I left this room, if I had been told that I would have a husband before I got back to it!"

Breckenridge's first thought was for his precious triplex automatic chronometer, which he found, of course, "way off"—six and three-tenths seconds fast. Having corrected the timepiece from that of the *Sirius*, he immersed himself in the other delicate instruments of his department—and he was easy to find from that time on.

Overcrowded as the *Sirius* already was, it was decided that the original complement of the *Arcturus* should occupy their former quarters aboard her during the return trip. To this end, corps of mechanics set to work upon the salvaged hulk. Heavy metal work was no novelty to the Callistonian engineers and mechanics, and the *Sirius* also was well equipped with metal-working machines and men. Thus the prow was welded; armored, insulating air-breaks were built along the stern, which was the plane of hexan cleavage; electrical connections were restored; and lastly, a set of the great Vorkulian wall-screen generators, absorbers, and dissipators was installed, with sufficient accumulator capacity for their operation. Director Newton studied this installation in silence for some time, then went in search of Brandon.

"I hadn't considered the possibility of being attacked again between here and Tellus, but there's always the chance," he admitted. "If you think that there is any danger, we will crowd them all into the *Sirius*. It will not be at all comfortable, but it will be better than having any more of us killed."

"With that outfit they'll be as safe as we will," the scientist assured him. "They can stand as much grief as we can. We'll do the fighting for the whole outfit from here, and anything we meet will have to take us before they can touch them. So they had better ride it

there, where they'll have passengers' accommodations and be comfortable. As to danger, I don't know what to expect. They may all be gone and they may not. We're going to expect trouble every meter of the way in, though, and be ready for it."

Everything ready and thoroughly tested, and stream of power flowing into the *Arcturus* from the cosmic receptors of her sister ship, the passengers and their new possessions were moved into their former quarters. There was a brief ceremony of farewell, the doors of the airlocks were closed, the careful check-out was gone through, and the driving projectors of the *Sirius* lifted both great vessels up the shaft, slowly and easily. And after them, as long as they could be seen, stared the thousands of Callistonians who thronged the great shaft's floor. Many of the spectators were not, strictly speaking, Callistonians at all. They were really Europeans, born and reared in that hidden city which was to have been the last stronghold of Callisto's civilization. In that throng were hundreds who had never before seen the light of the sun nor any of the glories of the firmament, hundreds to whom that brief glimpse was a foretaste of the free and glorious life which was soon to be theirs.

Up and up mounted that powerful tug-boat of space, with her heavy barge, falling smoothly upward at normal acceleration. Below her first Europa, then mighty Jupiter, became moons growing smaller and smaller. In their stateroom Nadia's supple waist writhed in the curve of Stevens' arm as she turned and looked up at him with sparkling eyes.

"Well, big fellow, how does it feel to be out of a job? Or are you going over there every day on a tractor beam to work, as Norman suggested?"

"Not on your sweet young life!" he exclaimed. "Norm thought he was kidding somebody, but it registered zero. It gives me the pip to loaf around when there's a lot of work to do, but this is entirely different. Nothing's driving us now, and a fellow's entitled to at least one honeymoon during his life. And what a honeymoon this is going to be, little spacehound of my heart! Nothing to do but love you all the way from here to Tellus! Whoopee!"

"Oh, there's a couple of other things to do," she reminded him gaily. "You've got to smoke a lot of good cigarettes, I must eat a lot of Delray's chocolates, and we both really should catch up on eating fancy cooking. Speaking of eating, isn't that the second call for dinner? It is!" and they went along the narrow hall toward the elevator. To these two the long journey was to seem all too short.

Long though the voyage was, it was uneventful. The occupants of the two vessels were in constant touch with each other by means of the communicators, and there was also much visiting back and forth in person. Stevens and Nadia came often to the *Sirius*, and were accompanied frequently by Verna Pickering, who claimed anew her ancient right of "kicking around under foot," wherever Brandon and Westfall might chance to be—and at such times General Crowninshield was practically certain to appear. And upon days when the beautiful brunette did not appear, the commandant generally found it necessary to inspect in person something in the *Arcturus*.

Day after day passed, and even the new and ultra-powerful detector screens of the *Sirius* remained unre-

sponsive and cold. Day after day the plates before the doubled lookouts and observers remained blank. Power flowed smoothly and unfailingly into the cosmic receptors, and the products of conversion were discharged with equal smoothness and regularity from the forty-five gigantic driving projectors. The tractor beam held its heavy burden easily and the generators functioned perfectly. And finally a planet began to loom up in the stern lookout plates.

Verna, the irrepressible, was in the control room of the *Sivius*, quarreling adroitly with Brandon and deftly flirting with Crowninshield. Glancing into the control screen she saw the planet in its end block, then studied the instruments briefly.

"We're heading for Mars!" she declared with conviction. "I thought it looked that way yesterday, but supposed it must be only apparent—a trick of piloting or something about the orbit. I thought of course you were taking us back home—but you can't possibly get to Tellus on any such course as this!"

"Sure not," Brandon replied easily. "Certainly it's Mars. Isn't that where the *Arcturus* started out for? Whoever said we were going to Tellus? Of course, if

any of the passengers want to go right back the IPC will undoubtedly furnish transportation *gratis*. But paste this in your hat, Verna, for future reference—when spacehounds start out to go anywhere they *go* there, even if they have to spend a year or so on minus time to do it!"

Closer and closer they approached the red planet, swinging around in a wide arc in order to make their course coincide exactly with the pilot ray of check station M14, which was now precisely in its scheduled location in space. At the chief pilot's desk in the control room of the *Arcturus*, Breckenridge checked in with the station, then calculated rapidly the instant of their touching the specially-built bumper platforms of spring steel, hemp, and fiber which awaited them upon the Martian dock of the Interplanetary Corporation. Within range of the terminal, he plugged into it, waited until the tiny light flashed its green message of attention, and reported.

"IPV *Arcturus*; Breckenridge, Chief Pilot; trip number forty-three twenty-nine. Checking in—four hundred forty-six days, fifteen hours, eleven minutes, thirty-eight and seven-tenths seconds minus!"

THE END.



In this department we shall discuss, every month, topics of interest to readers. The editors invite correspondence on all subjects directly or indirectly related to the stories appearing in this magazine. In case a special personal answer is required, a nominal fee of 25c to cover time and postage is required.

#### A VENEZUELAN READER GIVES HIS VIEWS; HE IS CERTAINLY ONE OF US

Editor, AMAZING STORIES:

I just received and read the April issue, which as usual, is very good. I have been a constant reader of both the Monthly and Quarterly since '26 and '28 respectively, but had never had any special reason to write to you and considered that my subscription and my silence were the best exponents of my satisfaction.

"Across the Void" so far, is equal to its original "Out of the Void." I suggest that whenever you publish a sequel, you give us information as to the issue in which the original story appeared, for I believe most of us like to review it before starting with the sequel and it would be very convenient to have such reference at hand and not have to hunt for it over the whole collection of A. S.'s.

And why not give us also a general index for each volume? It would be very handy for re-reading and for general purposes. Right now I wanted to comment on the work of Captain Meek; and wishing to give precise information of a story he wrote some time ago I spent some time looking for it through many issues till I got tired and let it go. . . . I wanted to give you the name of the story—a silly story about a submarine—and to say the least it seems impossible that its author is the same man who wrote "The Drums of Tapajós." My compliments to Captain Meek for such a wonderful improvement.

"The Laughing Death" is in general, just as you say "a corking good story—and different." . . . The science in it is questionable, but our new author is a promising one. BUT it is a thing to wonder at that an educated man, a writer such as Mr. Hale, could make a blunder such as appears on page 97 when he says, "Other races than the White began to appear; Blacks, Spaniards, Indians, Orientals . . ." I wonder if he thinks that there is only one white race, namely the "Yankee" . . . Are you a K.K.K., Mr. Hale? My ancestors were full-blooded Spaniards, the

Conquerors of America. . . I was educated in the States, yet nobody there ever questioned my belonging to the white race. . .

The possibility of Mr. Hale living near the Mexican border and being used to regard the Indians there—who have a streak of Spanish blood in them—as Spaniards, would be an excuse for an uneducated person, but not for him.

It is a fact that the common or uneducated people in the States have their own estimate of the different nationalities of the world; estimate that they form themselves from observation of the equally uneducated and low class groups of the divers nationalities with which they mingle—the immigrants—which are today, in general, the lowest type of each nation. It is within the scope of the A. S. to help to eradicate these misconceptions, even though its readers constitute a scientifically minded group and are, therefore, not easily misled in their conceptions or conclusions.

I want to congratulate you, Mr. Editor for the wonderful work you are doing and specially for your Editorials. My applause goes also for your department "Discussions" which I enjoy reading. Every day in every way A. S. must get better and better—that is my wish.

Alfonso Parra,  
Merida, Venezuela,  
South America.

(It is not often that we receive so many foreign letters as have come in our mail recently. We have the dictionary open before us and under the word Spaniard find the statement "The Spaniard are a very homogeneous people of the pure type of the Mediterranean race." It seems probable that Mr. Hale's reference was to Mexicans. We will try to get an expression from him as to what he did mean. The Mexicans are a very mixed race, including pure white, but the majority are pure Indian or else a mixed race. We shall hope to get the blunder about the Spaniards corrected by Mr. Hale. It is inconceivable that anyone should think that a Spaniard is anything but a pure Caucasian. We have the index in mind.—EDITOR.)

#### A LETTER FROM A YOUNG READER; THE QUESTION OF INVISIBILITY; OUR ANNUAL

Editor, AMAZING STORIES:

I am an interested reader in your publication. I wish to compliment your artists on their wonderful work. Perhaps some of your readers do not agree with me, but I think Paul is your best illustrating artist. His drawings have a more complete finish than those of the other artists. Morey's covers are excellent, but why not give your other artists the opportunity to draw some?

The stories are excellent. I believe that your best authors are A. Hyatt Verrill, Edmond Hamilton, and Dr. Keller. You have other authors who are probably just as good, but the three I have named appear outstanding to me.

"Television Hill" was a very interesting story, but the ending was very peculiar. I believe that a sequel to this story would prove very interesting.

"The Man Who Annexed the Moon" helped to give me a new conception of the fourth dimension.

"The Purple Plague" gives the reader a pretty clear idea of what the next war will be like.

"The Valley of the Titans" was the type of story that I've been looking forward to for some time. It is the type of story that is quite unusual.

"Across the Void" has all the earmarks of a good story. I hope the second instalment is as good as the first.

In the March issue of the AMAZING STORIES, a story by the name of "On Board the Martian Liner" appeared. The criminal who was clothed in a cloth of invisibility was able to walk into a room without anybody being able to see him.

This is a subject that other writers have commented on and declared that anything invisible cannot see. I not only believe this, but I also believe that no opaque solid can be invisible in such a way as to permit an observer to see the background behind the solid, therefore, the criminal in this story could not have been able to escape detection. Here are my reasons: We learn in physics that light waves cannot be bent to any

(Continued on page 572)



# COPIES OF THE ISSUES CONTAINING "THE MOON POOL" WANTED. FAVORABLE CRITICISM OF SOME OF OUR STORIES

## Editor, AMAZING STORIES:

A few years ago I went to New York for a visit. There, in a friend's home, I came across a copy of *AMAZING STORIES*, the one with the 1st part of "Treasures of Tantalus." The copy proved to be extremely interesting to me and I purchased some more.

Soon after my return to Denver, however, I stopped buying them for a while, for certain reasons, none of these reasons being the fault of the magazine.

Here again I came across the magazine containing that peer of all stories: "The Moon Pool." I'll confess I read it about half a dozen times and would it again, but I lost these copies, lending them to a friend.

Since that time, I have never missed a copy. Of course you know that there are other science-fiction magazines on the market, but you have the best talent.

The magazine as a whole is excellent. If I don't like a story occasionally, it's on account of personal taste and not due to lack of merit in the story.

Some of the stories I like best were: "The Sunken World" and "After 12,000 Years." Mr. Coblenz proves himself to be an idealist of the highest degree, showing us the world as he would like to see it, and in the other as probably the world would be. "The Time Defector" is a masterpiece of satire. "Futility" and "The World of Giant Ants" are wonderful. But I could not enumerate all the stories I thought great. There are too many of them.

Just finished the first installment of "The Drums of Tapanos." Both excellent and original. And I am willing to bet you will have a lot of requests for a sequel. Here is one anyway.

As to your artists doing your drawings, well, I've seen a number of automobiles that look a great deal like some vehicles of the future drawn by your artists just a few years ago. Draw your own conclusions.

A brick-bat. In your comment on "The Diabolical Drug," you said the idea was original. The story was good, but the idea wasn't original. See "The New Accelerator" by H. G. Wells. Will you kindly let me know if I can obtain those copies of *AMAZING STORIES* that have "The Moon Pool" and also "The Conquest of the Moon Pool," which I never read.

Joseph Beck,  
34 South Logan,  
Denver, Colorado

(You realize, as we see from your letter, that it is a bad plan to lend books and magazines. There seems to be a licensed system of keeping other people's books which is practiced in the best circles. If you will go through our Discussions Columns you will find that many people dislike a story which others like. So there is only one thing for a magazine reader to do and that is to pick out the stories which he likes. We are afraid that you will have trouble in finding the issues of our magazine containing "The Moon Pool" stories. There are many demands for back numbers which we are unable to satisfy and which may be answered by those who read the Discussions columns and have back numbers to spare. Perhaps this letter will reach someone who can give you what you want. It is always a problem to know how many extra copies of a magazine should be printed and we often wish we had printed more of the early issues.—EDITOR.)

## THE MOON POOL

### Editor, AMAZING STORIES:

I am very anxious to reread, and keep, if possible, Merritt's "Moon Pool." I would appreciate any information regarding this matter. Naturally, I should prefer it in book form if it has been so printed, but should be glad to re-purchase the magazines at your own price.

E. Rothstein,  
1836 72nd Street,  
Brooklyn, N. Y.

("The Moon Pool" has been published in book form, but it is now out of print. We publish your letter in hope that you may receive an offer of the magazines in question from some of our readers. We have not got the numbers containing them and they are all out of print.—EDITOR.)

## AN EXCELLENT LETTER FROM ONE OF OUR YOUNGER READERS

### Editor, AMAZING STORIES:

I have read *AMAZING STORIES* for several years. As this is my first letter, it will be a long one. Although I am only a sophomore in High School, I understand the stories very well.

Of course, I wish to name the stories I consider best. For sheer action, science, and all around ability, my vote goes for "Skylark Three," by Dr. Smith. "The Skylark of Space," also by Dr. Smith, is right up behind it. I see that several of your readers do not like the stories of Jules Verne. Well, I disagree with them. I consider "The Master of the World" was one of the best stories ever printed in *AMAZING STORIES*, and "The English at the North Pole," with its sequel, "The Desert of Ice," as being right up with it. The best of the shorter stories was "Ten Million Miles Sunward" (I have forgotten the name of the author). Other excellent stories were "Into the Green Primus," "Beyond the Green Primus," and "Vampires of the Desert," all by A. Hyatt Verrill. "The Sixth Glacier," by Marius; "Armageddon, 2919 A. D.," and "The Airlords of Han," by Francis Knowlton; "The Universe Wreckers," by Mr. and Mrs. Milton, though I did not care for his "World Atavism"; "When the Young Fought," "The Metal Horde," and "Solarite," by John W. Campbell, Jr., and for sheer beauty of plot and style, "The Ship That Turned Aside," by G. Peyton Wentzmaker, which I consider the most beautiful and interesting story I have ever read. I hope Mr. Wentzmaker will rescue the people cast away in the fourth dimensional world, or is it a three dimensional world?

I personally like *AMAZING STORIES'* paper, though I believe that if you print your stories on higher grade paper and call the magazine "Scientifiction," you would greatly increase your circulation. Your artists are very good, especially Wesco and Morey, though Paul's drawings of people are terrible. Most of the your biological satires are rather poor in comparison to the other stories.

I have finished the February issue and I think it is better than ordinary. "The Bess from Borome" is a short story with a real twist, though I hope a cross between a bee and a wasp never happens. "The Purple Plague" is highly exciting, convincing and scientific. I do not care for letters written in the future, although "Twenty Years from Today" is rather humorous. "Television" looks fine, but I am withholding comment until I read the next issue.

Your authors should remember that although they are writing about science, they are also writing fiction and therefore should keep plot and characterization in mind. In general, I believe *AMAZING STORIES* the best magazine out today.

Alan E. Blume,  
2820 Avenue L,  
Brooklyn, New York

(The writer agrees thoroughly with you in your estimate of the stories by Jules Verne. In one of the first that we published, he describes a trip into the interior of the earth, starting at Iceland and ending in the Mediterranean region. The few pages devoted to Iceland were extremely good and brought the country vividly before you. It seems that when our authors do as you suggest, and remember that they are writing fiction, they are bringing in the human motif of a love affair, many object, but it seems to us that the topic in question has been very beautifully treated by some of our authors.—EDITOR.)

## RADIO AND AMAZING STORIES

### Editor, AMAZING STORIES:

I am a very ardent reader of your magazine and as such would like to see it rise big and great over its lesser rivals.

*AMAZING STORIES* was the first scientific magazine on the market. Soon after its birth, a host of others rose up trying to imitate its example. These magazines, for a while, bid fair to usurp the place of the leader from *AMAZING STORIES*. The imminent knowledge of this set me thinking.

Why not go a step ahead of all other periodicals of a fantastic nature and enter the field of radio broadcasting?

The modern trend in the quest of knowledge is a scientific nature, and the favorite of the public today is Radio. The possibilities for advertising are enormous—literally world-wide. Can you not glimpse this, the importance this will achieve in years to come?

I have thought over a number of ideas, and have arrived at one which I think is ideal. It is a very effective way to advertise for a science fiction magazine. If you will grant me an in-

# Get your RADIO TRAINING From America's finest Radio School

**T**HE man who really wants to become an expert in radio... who knows that the better his foundation, the better his chances... and who is willing to spend a year preparing himself... such a man will make no decision until he has read the complete story of RCA Institutes, Inc.

## A Good Foundation Vital

Like other professions, radio rewards only those who excel. The poorly trained will never rise higher than the place in which they started. Others will climb step by step to positions of power in radio telephony... broadcasting... sound pictures... aviation radio... radio merchandising. And among these will be those who planned years in advance... studied, worked, stuck to it.

You are making your decision right now, how well you will fit yourself. So decide wisely. To be a graduate of RCA Institutes stamps you as a man who knows the real worth of a good foundation. As one who knows that a year of training now, under America's finest radio instructors, is the surest way to acquire the knowledge and skill you must have.

## You Can Study At Home

You do not have to give up your present position to enjoy the benefits of RCA Institutes training. You may study at home in your spare time... or at any of our resident schools throughout the country. The Home Laboratory Training Course includes a complete set of radio equipment of the most modern design.

## Send For Our Free Book

If you have read this far... you have already indicated that you are the type of man who should study radio. This may be the big turning point of your life. You will not rest until you have sent for our free book that tells you the complete story of what RCA Institutes offers you. Fill in and mail the coupon below right now. There is plenty of time for investigation... but no time for delay in getting all the vital facts.



## RCA INSTITUTES, Inc.

RCA INSTITUTES, Inc.  
Dept. EX-9  
75 Varick St., New York, N. Y.

Gentlemen: Please send me your FREE book which tells about your laboratory method of radio instruction at home.

Name.....

Address.....

Occupation.....





(Professor Newcomb did not believe in the possibility of so large an animal as a man flying. Exactly why we do not know. Professor Leffle, the State Geologist of Pennsylvania, did not believe the flow of petroleum from the earth could last as it has, and Professor Langley's death is supposed to have been accelerated by his failure in his attempts to make an airplane. Yet the scientists of today are just as blindly certain about the "yes" and "no" of their theories as were their predecessors, so do not be too sure of things. Some of the queer things that are given in our stories may yet come true. It was long before men found out that an airplane was supported by partial vacuum on the upper surface of its wings or realized the availability of upward currents of air for soaring (now incorrectly called gliding). When Faraday liquefied chlorine gas, a visitor came to the laboratory and told him that he had got oil into his glass apparatus, and the next day Faraday had the pleasure of telling him that it was liquid chlorine, not oil. The achievements of the last few years justify any amount of what would formerly have been called credulity.—EDITOR.)

#### A LETTER OF CRITICISM ABOUT SUNDAY STORIES, BUT HE DID READ ONE OF THEM SIX TIMES AND IS GOING TO READ IT AGAIN

Editor, AMAZING STORIES:

I have been a reader of AMAZING STORIES for three years and have never entered a discussion. Now I think that it is time for my say to go through. I don't think that I have made any mistakes in this letter, but if I have, they will, without doubt, be corrected.

I had nothing to say about "Through the Vibrations" because I did not read it. I did not read it because I am not interested in stories of such a nature; it may have been good—I don't know.

"The Cerebral Library" was fair, but Dr. Keller can write better stories. I know. It started off pretty well, but when the detective was introduced—well, that ruined the story. I don't believe that a detective should ever see the inside of a good science story; there may be many that agree with me, but I'll keep my thoughts.

"Beings of the Boundless Blue" contains some mistakes, doesn't it? In the story, Mr. Kingston didn't think that the explanation of moving iron atoms was very good. He thought that the electrons or bits were being enlarged, and the noise was produced by colliding electrons. If electrons are negative in character, would they not try to repel each other? Also—if the orbits of the electrons were enlarged, why wouldn't the proton have to lose an electron or two in order to make it more positive so that it could keep the outside electrons from flying away as their attraction for each other would become less as the intervening distance became greater? If a certain disk of "Transmute" would affect protoplasm, i. e., him, wouldn't it affect his clothes in the same way despite the fact that it wasn't supposed to? All electrons are the same.

Again—Mr. Kingston had fine respiratory organs. According to the story, he wasn't suffocating at a height of fifty miles.

"Across the Void" was a pretty good story as that type runs and as far as it has run. (Celo sub.)

I don't think I'll make comment on "The Great Catastrophe of 2947."

"A Voice from the Ether" was the only story that saved the issue. I read it six times and will continue to read it. But, according to the story, I learned that, theoretically, something can be divided in half forever. If you cut something in half, you would have two halves. The amount of material would always be equal to the original piece, but if the process were reversed, more material would be needed; where did that come from?

Why not take the best stories from the quarters and at the end of the year put them in book form?

Arnold Wolf,  
640 Riverside Drive,  
New York, N. Y.

(Your criticism is greatly softened by two facts—one that you did not read one of the stories and so we are spared criticism of it. The other saving feature is that you read one of the stories six times over and are going to read it more. The reverse process of cutting things in half would certainly seem to involve getting more material, so your sixth comment does not involve a puzzle. We are so anxious to please our readers, and we need intelligent criticism to help us, that we are very glad to get such letters as yours.—EDITOR.)

#### A CORRESPONDENT IN OUR ATTEMPTS TO WRITE SOME THOUGHTFUL CRITICISM

Editor, AMAZING STORIES:

Although I am writing this, my first letter to AMAZING STORIES, to compliment you on your fine magazine, I also have some brickbats to throw, or rather, it is better to say, some criticism and suggestions to offer.

The best stories in your last three issues were:

- 1—The Drums of Tadjos
- 2—The Prince of Space
- 3—The Purple Plague
- 4—The Earth's Cancer
- 5—The Black Hand
- 6—Television Hill

Two of these stories was a masterpiece. We must have a sequel. "The Earth's Cancer" was good also.

I consider that "The Purple Plague" was an exceptional story and it was written in a far better style than is attained by any other of your writers. The characters in this story were real, that is the author invested them with reality, and instead of devoting all his time to scientific theories and facts, he spent quite an amount of it in developing a highly interesting and plausible tale.

The place for poetry is in a poetry book not in AMAZING STORIES. A whole page was wasted in the March issue on a well-composed, but rather frivolous poem.

Your covers are steadily improving and the March cover was the best, as far as coloring and general appearances were concerned you have ever had upon "our mag." Why let Morey do all the covers and nearly all the drawings when you have such capable artists on your staff as Paul and Muller. I liked Muller's drawing in the November issue and would like to see him do a cover.

I am infinitely glad you have kept to your original size as it gives a better appearance to the magazine than a scraggy 9" x 6" one.

Keep your standard up and your mag. or "our mag." will prosper.

It is now the best magazine of its class on the newstands in Australia, but has little circulation here and I know of only one News Agent where they can be obtained regularly.

Print some more stories by C. Gardner Powers and above all a sequel to the "Purple Plague."

C. Morrison,  
9 Hanby St., Brighton Beach,  
Melbourne, Australia.

(This letter from distant Australia is interesting in view of the letter from Mr. B. J. Kempton, who objects to the very cover illustration, namely that of the March issue, which you consider the best we have ever seen. You have no idea of the amount of thought that is given to our illustrations in general and especially to the cover page illustrations. We consider personally that Muller's drawings were very interesting, but they were severely criticised and objected to by our correspondents. Our Circulation Manager has been notified of what you say about the difficulty of getting "our mag." as you call it in Melbourne and he is quite interested and will use the matter. Persons who say that foreign readers would have more satisfaction if they would subscribe to the magazine so as to get it regularly and without any effort on their part. We have received some scientific poetry which is so good that we publish it with hesitation. Do you not think that it leavens up our magazine? The said "Atlantic Monthly" publishes poetry, so we hope that our doing it in very small measure will not reap disapproval from you.—EDITOR.)

#### A LETTER OF APPRECIATION FROM AN IOWA MAYOR, WHO LOVES IOWA

Editor, AMAZING STORIES:

For a couple of months I have been planning to write to you in reference to the controversy about action, romance and adventure in scientific fiction. Was especially interested because I heard that R. F. Starzl, one of my favorite authors, is also an Iowan. In Iowa we raise good hogs, tall corn, and first-class writers. Herbert Quigg, the novelist, was an Iowan. George Parker Butler, the humorist, was an Iowan, and now I am glad to hear that another writer, distinguished in the entirely different field of scientific fiction, also hails from my state.

In addition to "The Globoid Terror" in the current issue of AMAZING STORIES, I was well pleased by "The Drums of Tadjos." Capt. Meek is usually a little faster in his beginnings, but

## MYSTICAL LAWS OF LIFE

### Reveal Astounding Inner Powers

How much have you used your subjective partner? There are TWO of you—one the PHYSICAL, material side—the other, the INNER, PSYCHIC SELF. If you are one of the thousands who are searching for a way and a means of attaining PROSPERITY, HEALTH, and HAPPINESS, why not release that great force within, use that dormant self?

The Rosicrucian Brotherhood, a world-wide movement, has taught thousands of men and women how to use the simple, dignified occult principles in developing their latent powers. A few minutes a day devoted to the reading of these principles will reveal startling facts to YOU. If you are sincere in your desire to MASTER LIFE, this is the key.

#### Free Book Tells Story

An interesting book, called "THE LIGHT OF EGYPT," will be sent, without obligation, to those who are seeking to become a success in life. This book will be mailed, postpaid, to those who write a letter (not a post-card) requesting it. Address:

LIBRARIAN C. Y. W.

#### ROSIKRUCIAN BROTHERHOOD (AMORC)

SAN JOSE -- CALIF.

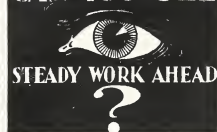
Perpetuating the Original and Only Rosicrucian Fraternity Known Always as AMORC

## BECOME AN EXPERT ACCOUNTANT

Executive Accountants and C. P. A.'s earn \$5,000 to \$10,000 a year. Thousands are needed. We train you thoroughly at home in spare time for C. P. A. examinations or executive accounting positions. Proven bookkeeping system of accuracy and efficiency. Training given by C. P. A.'s. Write for free book, "Accountancy," the Professional Standard and Guide for the Future of the Accountant. Free literature, free examination.

Los Angeles Extension University, Dept. 364-H, Chicago  
The School That Has Trained Over 1,200 C. P. A.'s

## CAN YOU SEE



## STEADY WORK AHEAD

U. S. GOVERNMENT JOBS

\$1260 to \$3400 A YEAR

Men—Women—18 to 50

STEADY WORK

Paid Vacations

Common education

usually sufficient

Mail Coupon

SEND

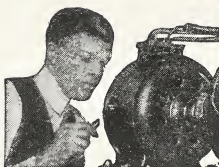
Franklin Institute  
Dept. F-178  
Philadelphia, V.

Continued: Rush to me FREE

my STEADY position and

salary, hours, work, vacation etc.

How to get a position



## Amazingly Easy Way to Get Into ELECTRICITY

Dissatisfied with your job? Not making enough money? Then let me show you how to prepare for a real job and how to make real money—in **ELECTRICITY**, the great money-making field!

## TWELVE WEEKS of Practical Shop Training

Come to Coyne in Chicago and learn Electricity the quick and practical way - by actual work on actual machinery and equipment. No useless theory. The average time to complete the course is only 12 weeks. You work on real dynamos, switchboards, armatures, auto and airplane engines, transmitting stations, etc. - everything from door bells to power plants - in full operation every day! No previous experience necessary at Coyne.

## Free Employment Service to Students

When you graduate, we'll do all we can to help you get the job you want! We employ three men on a full time basis whose sole job is to help secure positions for students. Also, we'll help you to earn while learning. Some of our students pay a large part of their living expenses through part-time work we get them. Get all the facts!

## Coyne Is 32 Years Old

Coyne has been located right here in Chicago since 1899. Coyne training is tested—proven by hundreds of successful graduates. Get all the facts! It costs nothing to investigate. **JUST MAIL THE COUPON BELOW FOR A FREE COPY OF MY BIG ELECTRICAL BOOK**, telling all about jobs... salaries... opportunities. This does not obligate you. Just mail the coupon!

**H. C. LEWIS, President**  
Coyne Electrical School, Dept. 61-27  
5 S. Paulina St., Chicago, Ill.

Dear Mr. Lewis:—Without obligation send me your big, free catalog and all details of Free Employment Service, Radio, Airplane, and Automotive Electrical Courses, and how I may "earn while learning."

Name.....

Address.....

City.....State.....

the reader who stays with him for the first slow pages soon finds his interest gripped.

"Solarite," by John W. Campbell, Jr., was up to expectations. It may seem odd that an admirer of the R. F. Stalzel type of action story should like another story that is diametrically opposed to the action type, being composed almost entirely of scientific speculation. The reason is that Campbell always has something new and plausible to offer. If all authors could write "science" the way Campbell does it, I'd say, give us Science. But most of them simply hash and rehash old ideas. Few of them could learn to write like Campbell, but some of them could emulate masters like Stalzel and Meek, not to mention A. Merritt, Murray Leinster, etc. All right, let them study REAL scientific fiction and emulate the leaders.

Why don't you print a ballot on the subject of Science vs. Story Interest, and find out just what the readers think?

Respectfully,

F. P. Petges,  
Struble,  
Iowa.

(From a serious standpoint we think that Iowa did well in producing so good a writer as R. F. Stalzel. George Parker Butler is one of the leading writers of the day and certainly does credit to your state. Personally we are familiar with the work of Herbert Quick. We receive so many letters from our readers that we have abandoned practically the taking of ballots. When the magazine was young, this practice was indulged in but never too much.—EDITOR.)

### A WELL-THOUGHT-OUT LETTER FROM A YOUNG CORRESPONDENT

Editor, AMAZING STORIES:—Although a reader of your excellent magazine for several years, in fact, since the first issues, I have thus far neglected to write you regarding my various views about the "American Father of Scientificism."

Firstly, let me say that although your stories are almost all very good, you are running rather too many longer stories which, in many cases, may be a trifle boring to the reader. I, personally, would prefer one long story to begin with, such as "The Valley of Titans," followed by shorter ones by Captain Meek, Campbell, Dr. Brewer, and others.

Secondly, why are we not having more by the gifted pens of Keller and Wells? Both are writers of the first rank, men who may be calculated to turn out the best at all times. Also, I have heard more of Captain Meek's military and war-type stories. Meek knows what he is talking about, and therefore, gives us a better tale.

Thirdly, as regards the art work of AMAZING STORIES: it is quite good, except when an artist attempts to become a modernist. More is a very good man for this type of work, and his people are natural. His cover designs, however, leave something to be desired, although his sky and background in the March issue was admirably done. Paul's machines are unequalled. If his people are sometimes criticized. Anyway, he is hired to draw scientific and not people.

In your book-review section, I was very much disappointed to see that a "Tarzan" book had received mention. If Burroughs' books are very good, then his "Tarzan" books are very poor. In my opinion, they are merely cheap trash for juvenile or morose consumption. Please mention to the Science Questionnaire. It leaves the reader to think and not skip over the scientific discussions.

And lastly, "Mush" is odious. A certain amount of love and human-interest is a tonic to all concerned.

Please pardon these criticisms from a 14-year-old stripling.

Robert D. Heintz, Jr.,  
2400 California St.,  
Washington, D. C.

(You speak of a tendency of our giving too many long stories. We have been afraid that we have been going too far in the other direction. You must remember that whatever kind of cover designs we give, they will not please everybody, but we are interested to find a favorable criticism of the cover of the March issue which, you will observe in the letter preceding yours, was assailed quite strongly. The Burroughs' book was reviewed by a critic who has a wonderful knowledge of this type of literature. We feel that his book reviews are specially valuable. Our tendency now is to give more rather than less space to the Questionnaire. It is a sort of justification of the Editor's efforts. We shall hope to hear from you again.—EDITOR.)

### A CORRESPONDENT WHO HAS AN INTERESTING VIEWPOINT (OR SEVERAL) Editor, AMAZING STORIES.

I am an art student at the Pratt Institute of Fine and Applied Arts, and an ardent reader of your fine magazine. I think your artists are all good but, Muller, who illustrates the "Purplage" is the best. Just one look at that picture would stir the dullest imagination! I felt sure that there was a wisp of a tale. He sure knows how to suggest action and suspense. That rocket was better than Paul could have done. So let's have some more from him. And let's have some more from Wesso.

"The Purple Plague" was the best story we've had since the "Skylark" series. But the author cut it off short as though he were anxious to get done or hold out for a chance to write a sequel; now ask him for me, what did "So" do with the Chinese girl after he got her home? Maybe that was too much of a problem for the author to figure out. Wesso made quite a mistake on the illustration. The suit should be part of the wall until detached. Only in this way would it be safe. There should be no opening in the wall except when the suit is detached.

Now, just a bric-a-brac about "Twenty Years from Today." If the author had not done the best of the sun, they could not communicate it to the ground, which would even be deprived of the usual amount of heat and would be colder than ever. I guess a glass roof over Alaska would be more practical.

Charles Schneeman,  
1461 East 63rd Street,  
Brooklyn, N. Y.

(The artist, Muller, whom you refer to, was not a favorite with our readers in spite of his high ability. He certainly possessed the art of putting life and a meaning into his work. Our present batch of artists seem to have found favor with our readers. We wish all our readers gave the same attention to the details of our stories that you do. The editing of a magazine like A. S., with so much science in it, is not an easy task.—EDITOR.)

### OPPORTUNITY AD-LETS

These columns will appear monthly in

AMAZING STORIES. Agents should send copy of Rate-Eight cents a week. Cash should accompany all advertisements unless placed by an accredited advertiser. No advertising in this column. 10 words not accepted. Radio-Science Publications, Inc., 281 Fourth Avenue, New York City.

### AGENTS WANTED

1. CALIFORNIA Perfumed Baked, selling like hot cakes. Agents earning money. Catalogue free. Mission Factory, 2328W Pico, Los Angeles, Calif.

### CORRESPONDENCE COURSES

Used Correspondence School courses sold on repurchase basis. Also rented and exchanged. Money back guarantee. Catalog free. (Courses bought.) Lee Mountain, Pisgah, Alabama.

### DETECTIVES

DETECTIVES. Work home or travel. Experience unnecessary. Particulars free. Write George Wagoner, 2190-X, Broadway, N. Y.

### MISCELLANEOUS

BACK NUMBER SPECIAL: Fiction Magazine, Stuyvesant Book Shop, 31 3rd Ave., New York City.

### PERSONAL

TALKIE AND MOVIE PRODUCERS are clamoring for new story ideas, plots, etc. Perhaps you can write one that we can shape and sell for you. One writer (W. M.) received \$3,000. New York best success. Send us your story, free, without obligation. HOW TO WRITE FOR THE TALKIES! Daniel O'Malley Company, Inc., 100 Broadway, New York City.

### PRINTING OUTFITS AND SUPPLIES

COMPLETE PRINTING OUTFITS, presses, type, ink, paper supplies. Write for catalogue, Kelkey Co., G-67, Meriden, Conn.

### SONGWRITERS

SONGWRITERS: Read "Song Requirements of Talking Pictures, Radio and Records," an explanatory, instructive book SENT FREE to aspiring writers of words for songs. We compose, arrange music and secure copyrights. Write today, A. S. Newcomer Associates, 1674 Broadway, N. Y.

SONGWRITERS: Your FREE BOOK is waiting to be sent on to you, containing the most instructive and valuable information for essentials for Talking Pictures, Radio and Records, ever offered. BIG ROYALTIES paid by Music Publishers and Talking Picture Studios. Song HITS. Submit your best poems for Free examination and advice. If we compose music to your poem or news item, it will be accepted for publication by a Reliable New York Music Publishing Firm. Copyrights secured. Anything you write for music. WRITE TODAY. Mahoney Associates, 2-2 E. 23rd St., New York.

# You Asked Us for this Valuable Book

*And NOW It's Ready!*

**"23 Lessons in Radio" Yours FREE!**  
*With This New Money-Saving Offer*  
**from RADIO NEWS**

SO many requests have come into this office asking us for a book covering the Junior Radio Guild lessons, that we have at last, with considerable time and effort, compiled this material (along with some other information) into a great new book!

Boys just beginning radio training—young men needing a reference book which contains the fundamental principles of radio—more experienced men wanting the latest dope on the essentials—all will find "23 LESSONS IN RADIO" the answer!

You—the readers of RADIO NEWS—have asked us for this book, and we are not only glad to be able to present it to you—but we are even more pleased to be able to present it to you FREE!

## A Foundation for All Radio Men

All radio men know the tremendous value of a good background in this field. To be well grounded in the first essentials is the kernel which develops success!

"23 LESSONS IN RADIO" furnishes this background. It is not only written to be easily read, but it also contains innumerable illustrations, charts and schematic diagrams. Just for example, the first few lessons are an exposition of radio principles, and they tell how to build, step by step, a complete 5-tube radio receiver. Later lessons include instructions for building a short-wave converter for this same receiver.

There is a chart explaining the standard radio symbols used in sche-

matic diagrams—a chart of the International Morse code—and a thousand other things which make this book a thoroughly comprehensive training for the radio set builder, the experimenter, the service salesman, and the dealer.

**And Now You May Have This Book FREE—Just Sign the Coupon TODAY!**

"23 LESSONS IN RADIO" is not for sale anywhere! But by subscribing through this special offer, you receive not only this great book FREE, but you also receive two whole years of RADIO NEWS for only \$4. a saving of \$2 over the single copy price. Besides, you do not need to pay the entire amount now! Simply fill out the coupon below and

send it to us with \$1! We will immediately mail your "23 LESSONS IN RADIO" and your first issue of RADIO NEWS. Then you may pay the balance later as we bill you, in easy installments of \$1 a month for 3 months. Renewal or extension of current subscriptions accepted on this offer, but payment must be made now, as specified above, not when subscription expires.

**RADIO NEWS, Dept. 2109-B**

351 Fourth Avenue, New York, N. Y.

Enter my subscription for two years of RADIO NEWS, and send me the book "23 LESSONS IN RADIO"—all for only \$4.00. I am enclosing \$1.00 herewith, and will pay the balance, \$3.00 a month, for the next three months. (One extra issue—25 months in all—if you send the full amount with your order.)

Name .....

Address .....

City ..... State .....

If renewal check here ☐

Are you a Serviceman ☐ Engineer ☐ Dealer ☐

Experimenter ☐ Radio Technician ☐

23  
LESSONS  
IN  
RADIO

23 LE  
I  
RA

Compiled  
by the  
TECHNICAL  
STAFF  
of  
RADIO  
NEWS

"23  
Lessons in  
Radio" is  
bound in heavy red  
leatherette, embossed  
in gold. The above photo-  
graph is actual size.



# The Most Interesting Evening I Ever Spent

UP TILL 9 o'clock the party was a complete flop. Nobody seemed to be able to get things going. Then Tom walked in. Tom's a live wire, if there ever was one.

He said he'd heard about a one man show anyone could perform with the help of a book he knew about. He had sent for that book, and said he was going to put on the show.

We thought he was joking, and laughed at him, but he sat us all down in the living room, got out a pack of old playing cards, and started to do things that made our eyes pop out of our heads.

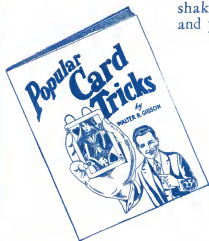
For over 2 hours he made those playing cards almost talk. What he could do with those cards just didn't seem human. After it was all over, the gang all crowded around shaking his hand, and patting him on

the back. The girls all said, "Oh, Tom! You're wonderful!" It was by far the most interesting evening I had ever spent.

I asked him how he learned it all, for I knew he didn't know a single thing about card tricks a week before. For answer he pulled out a shiny new quarter, and said that one just like it had taught him every trick he had showed us.

And it was a fact! Tom had simply enclosed a quarter with the coupon below, and gotten Walter Gibson's Famous Book of Popular Card Tricks by return mail. You, too, can entertain yourself and your friends with the 100 card tricks it teaches. No sleight of hand is necessary—no hard work to learn. Simply read the book carefully and you can do every trick in it.

*And it costs only 25c!* Send for it today. The demand is great, and we only have a few hundred on hand.



**SIMPLY  
CLIP  
AND  
MAIL  
THE  
COUPON**

**EXPERIMENTER PUBLICATIONS, Inc.**  
Dept. 2109, 381 Fourth Ave., New York, N. Y.

I enclose 25c. (in stamps or coin) in full payment for Walter Gibson's Book of Popular Card Tricks, which, it is understood will be sent me by return mail.

Name.....

Street & No.....

City..... State.....